CIENCE LIBRARY

JUL 7 1924

Museum
Col. Mus

Old Series, Vol. XLIX

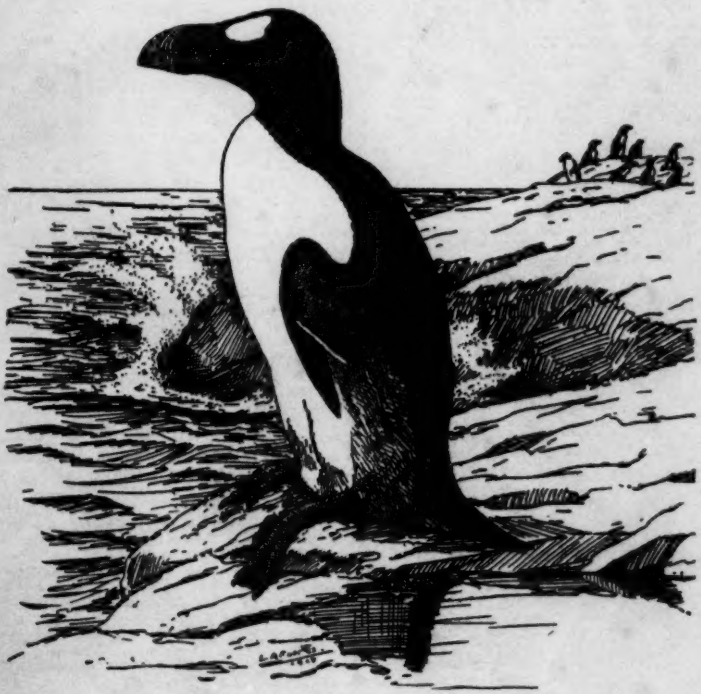
CONTINUATION OF THE
BULLETIN OF THE NUTTALL ORNITHOLOGICAL CLUB

New Series, Vol. XLI

The Auk

A Quarterly Journal of Ornithology

Vol. XLI JULY, 1924 No. 3



PUBLISHED BY

The American Ornithologists' Union

LANCASTER, PA.

Entered as second-class mail matter in the Post Office at Lancaster, Pa.

CONTENTS.

THE DAILY LIFE OF THE AMERICAN EAGLE: LATE PHASE. By *Francis H. Herrick*. (Plates XXI-XXVI) 389

AN ARIZONA VALLEY BOTTOM. By *Florence Merriam Bailey* . 423

THE POLYNESIAN FRUIT PIGEON (GLOBICERA PACIFICA), ITS FOOD AND DIGESTIVE APPARATUS. By *Casey A. Wood* . . 433

IS PHOTOPERIODISM A FACTOR IN THE MIGRATION OF BIRDS? By *G. Eifrig* 439

THE SONG OF THE SONG SPARROW. (A SYSTEMATIC STUDY OF ITS CONSTRUCTION.) By *William C. Wheeler* and *John T. Nichols* 444

BIRD BANDING AT THOMASVILLE, GEORGIA, 1924. By *John B. May, M. D.* (Plates XXVII-XXVIII) 451

NOTES ON THE GENERA OF CACIQUES. By *W. De W. Miller* . . 463

GENERAL NOTES.—Franklin's Gull at Philadelphia—A Correction, 468; Gulls and Terns Feeding on the Seventeen-Year Cicada, 468; First Ontario Record of *Fulmarus g. glacialis*, 470; Status of the Black and Mottled Ducks in Colorado, 471; Blue-winged Teal Breeding on Long Island—Supplement, 471; Ring-necked Duck in Delaware County, Pennsylvania, 472; Snow Geese at Boonton, N. J., 472; Least Bittern in the Orient Region, Long Island, 472; Snowy Egret (*Egretta candidissima*) at Newport, R. I., 473; The Stilt Sandpiper (*Micropalama himantopus*) in South Carolina, 473; An Oyster-catcher in Brunswick County, Virginia, 473; Viability of Seeds passing through the Alimentary Canals of Pigeons, 474; Black Vulture (*Coragyps urubu*) nesting in Maryland, 475; A Set of Three Eggs of the Turkey Vulture, 476; The Mississippi Kite (*Ictinia mississippiensis*) at Cape May, N. J., 477; Another Goshawk's Nest in Massachusetts, 478; Great Horned Owl at Englewood, N. J., 478; Nesting Habits of the Long-eared Owl, 479; Northern Pileated Woodpecker in Dutchess County, N. Y., 480; Red-headed Woodpecker in Lincoln, Mass., 480; Nest and Young of Yellow-bellied Flycatcher, 480; Clarke's Nutcracker in Interior Alaska, 481; Further Increase in Grackles at Portland, Maine, 481; Redpoll (*Acanthis linaria*) in Alabama, 482; Breeding of MacGillivray's Seaside Sparrow in South Carolina, 482; *Melospiza melodia atlantica* on the Coast of South Carolina, 484; The Scarlet Tanager (*Piranga erythromelas*) on the Coast of South Carolina, 484; A Remarkable Cedar Waxwing (*Bombicilla cedrorum*), 485; Blackpoll Warbler in Denver, Colorado, 485; Yellow-breasted Chat (*Icteria virens*) in New Hampshire, 486.

RECENT LITERATURE.—Grinnell and Storer on Animal Life in the Yosemite, 486; Howell's 'Birds of Alabama,' 489; Beebe's 'Galapagos,' 489; Dr. Dewar's 'The Bird as a Diver,' 490; Tait's 'The Birds of Portugal,' 492; Lowe's 'Literature of the Charadriiformes,' 492; Swarth on the Birds of the Skeena River Region, B. C., 494; Sclater's 'Systema Avium Ethiopicarum,' 494; Hellmayr and Zimmer on New South American Birds, 495; Bannerman on African Bulbuls, 496; Poncy on Contents of Bird Stomachs, 496; Richmond and Swales on New Haitian Birds, 496; Bannerman and Bates on Birds of Cameroon, 497; Lonnberg on Birds from Kansu, 497; Witherby's 'Check-list of British Birds,' 497; Recent Papers by Hartert, 498; Dr. Weeks' Bird Poems, 498; Birds and the English Whitethorn, 499; Sapsuckers Distributing Diseases of Trees, 499; Mathews' 'The Birds of Australia,' 500; The Ornithological Journals, 500; Ornithological Articles in Other Journals, 505.

CORRESPONDENCE.—Ornithological Nomenclature, 507.

NOTES AND NEWS.—Obituary—Lieut. Col. Henry H. Godwin-Austin, 512; Comeau Memorial, 513; Bird Protection Notes, 513; The R. A. O. U. Check-List, 514; Prince Taka-Tsukasa—Personal Mention, 514; Baird Ornithological Club, 514; Glover Allen's 'Introduction to the Study of Birds,' 514; The Pittsburgh Meeting of the A. O. U., 514.

UNIV. OF MICH.

FAMILY GROUP AFTER FLIGHT OF FIRST EAGLET, JUNE 28, 7 A. M. MALE ON NEST HAS BEEN FEEDING THE YOUNG BIRD.

THE AUK:

A QUARTERLY JOURNAL OF

ORNITHOLOGY.

VOL. XLI. JULY, 1924. No. 3.

THE DAILY LIFE OF THE AMERICAN EAGLE: LATE PHASE.

BY FRANCIS H. HERRICK.

Plates XXI–XXVI.

IN earlier papers[1] I have given an account of the observatory erected at Vermilion, Ohio, in 1922–23, and of the nest and nesting habits of the American or White-headed Eagle (*Haliæetus leucocephalus*), as observed on the southern and eastern shores of Lake Erie. I will now record the results of our studies of the domestic life, the instincts and habits of the Eagle, made at Vermilion in the summers of 1922 and 1923.

Our best policy at the start, though contrary to our desires, was to put the cart before the horse and begin detailed observations at a comparatively late phase of nest-life, since we could not afford to interfere in any way with the eggs or newly hatched young until the habits and idiosyncrasies of this particular pair of Eagles were better known. We have succeeded thus far in avoiding any serious accident or mishap, but a third season will be needed to carry out our plans. In the spring of 1924 I hope to make this record more complete in the earlier stages, of which only a rough reconnaissance has thus far been made.

[1] See "The Eagle as Emblem." 'Western Reserve University Bulletin,' Vol. XXVI, Cleveland, 1923. "An Eagle Observatory," 'The Auk,' Vol. XLI, and "Nests and Nesting Habits of the American Eagle," 'The Auk,' Vol. XLI, 1924.

In 1923, if our estimate of the incubation period is correct, Eaglet No. 1 spent seventy-two and Eaglet No. 2, seventy-four days, in this case continuously, in the eyrie. Allowing then from 10 to 11 weeks for the life of the young Eagles in the nest, about one-half of this period, or five weeks, is passed in the white and gray down stages and the other half in the juvenal dress. Mid-May marked the transition stage here between the last two plumages, the heads of the Eaglets being then enveloped in gray down while their bodies were sprinkled with dark brown, sprouting, contour feathers, and the wing and tail-quills were then fairly developed. In late May the full juvenal dress was established, and it is this final phase, lasting approximately five weeks, or up to the time of independent flight, which will engage our attention in the present paper.

Whenever the nest of a wild bird is accessible from the ground it is usually possible to conduct a certain number of simple experiments, such as to mark and weigh the eggs, and ascertain the time of hatching of each, to mark, weigh and measure the young as they issue from them, to gather data for determining their rate of growth, and to test their reactions at different ages, but in the present instance the field of direct experiment was almost completely barred. By placing our construction, with its platforms, ladders and tent, so close to the eyrie, we produced, of course, a rather striking change in natural conditions, but if tolerated at all its effect was bound to be transitory, and we were never at a loss to know when the behavior of the old Eagles was untrammelled and free. Accordingly we must be content to observe and record the behavior of old and young birds from the supreme vantage-point which the elevation of our tent affords, assured that at least we can mark the rise and surge of instinct and watch the play of habit under conditions of nature's own making. By maintaining continuous observations throughout the day, or from about five o'clock in the morning until seven at night we have been able to obtain very complete records concerning food-habits of a particular Eagle family at a certain time and place, as well as of activities of old and young birds at the eyrie and within a radius of about a mile from it in all directions.

The stage for action, the flat top of the great eyrie, which has

an area of nearly 60 square feet, being unalterably set, the reader must imagine the observer as able to look down upon it from a fixed point, 100 feet from the ground and 19 feet above the margin of the nest itself (See Pl. XXVI.), and as concealed at all times except when entering or leaving his tent; with an eye commonly fixed at a forward peek-hole he stands over the camera, with note-book ready and binoculars at hand. Other peek-holes are also available and they command the country for many miles in every direction. His efforts are mainly directed to following the activities of the old Eagles as they sally forth from their habitual perches to the lake or to the fields for their prey, and as they return to the eyrie with their quarry, when the nesting scenes take on the liveliest interest, in noting the character, treatment and service of the food and the final return of the parent birds to their perches.

The Eaglets, at first rather sluggish in their movements, become daily more active as the close of their nest-life approaches. To follow the rise of aquiline instincts, the reactions of the Eaglets to their food, their parents and to one another, as well as to all other objects which enter their effective environment, their preening, their play and all the varied exercises by which nature gradually fits them for independent flight and the serious business of later life, has proved no less interesting than watching the behavior of the old Eagles themselves. In all such instinctive acts we see the primitive patterns on which behavior has been delicately modelled by heredity and other evolutionary factors; but while the Eaglet in its every act follows in general the model to which the adult also conforms, like his elder he is also adaptable and his behavior at this phase is never perfectly stereotyped. He cannot remain a reflex automaton for long, and those instincts which are most deeply ingrained soon become shaded or in some degree altered and refined by experience; intelligence in the form of habits has begun to modify the web of his instinctive life. As a consequence you can never predict what variants may arise in the nesting scenes, or what the day or the hour may bring forth. As the effective environment of the Eaglets expands their attention is more and more directed from the nest and its contents to all moving objects which come within the range of their vision. When they are finally tempted to leave the eyrie under their own power, they will be well

fitted to deal with their prey and to bear it aloft in their talons; so perfect will the coordination of muscles and nerves have become, and so complete their mastery of the air, by daily practice, that to make a mile in their first sustained flight will be an easy task.

The Vermilion eyrie, that has just entered upon the thirty-fifth year of its history and has a direct line of predecessors which can be traced back for ninety years, stands in an open grove one mile to the south of the shore of Lake Erie, and thirty-eight miles due west from Cleveland, Ohio. An observer at the tent-front faces north by east and looks directly down upon the top of the eyrie which at that height is seen projected upon cultivated fields that extend half a mile or more to the Lake Road; beyond are railroad lines paralleling the shore which can be followed from Lorain Point to a wooded section near the town of Vermilion on the west; in other directions the eye encounters buildings in a farming country liberally sprinkled with hardwood forest.[1]

II. THE EAGLE AT REST.

During the breeding season the Eagles' day is divided into periods of comparative repose or apparent indolence, when resting on their perches, and of lesser intervals of great activity when stirring abroad in search of food or when delivering this at the nest. The perch may be the top of any tall tree, preferably a dead one, and the taller the better, from which they can watch for prey and guard the nest. The shore, the island, the river-bank and all points where Eagles congregate or nest, are certain to harbor such favored posts; there we may often see an old Eagle perched, perhaps when a mile away, and there it may spend many hours in watchful waiting particularly if the nest be near. The favored perch is the one which has proved its use by experience and it is adhered to by habit.

At Vermilion five perches were in common use in 1923, all being in plain view from our tent, and all on the easterly side of the grove at distances of 300 to 600 feet or more from the nest-tree. The easterly position of all these sentry-posts was clearly determined

[1] As stated in an earlier paper, I was ably assisted in 1922 by Mr. Everett C. Myers, and in 1923 by Mr. Elbert J. Humel, and our combined notes, covering a period of 36 days, have been incorporated in the account which follows.

by experience, for upon that side was a lane, on which regular or irregular visitors to the grove, whether men or cattle, were daily passing. To the perches in general use it became necessary to give distinctive names, as 'Tall East Perch,' the dead top of a pignut hickory, the highest and most favored of all, that stood at the easterly entrance to the grove itself and commanded the whole neighborhood, 'Horizontal Fork,' 'North' and 'South Forks,' on which it was not unusual to see both Eagles perched at the same time and on the first of these standing close together on the same branch. In every case the perch was a dead limb which commanded an unobstructed view of the great nest. In addition to these tree-perches there was also a nest-perch, to be presently described, but when no particular perch is mentioned the reference will be to one in the grove at a distance from the nest.

Since the female is noticeably larger than the male, the sex of the perching birds was readily determined whenever the two were together, and at the nest we could distinguish the female by her perpetual frown, imparted, as it seemed, by the great development of her supraorbital processes. Such means of ready distinction seldom failed, except when the perches were deserted and the visiting bird came to the eyrie and left it with extraordinary speed. The heads of the pair were equally white, and in either case lightly stippled with brown, but of the two the male seemed to have the whiter tail.

When standing before us in full sunshine either bird presented an admirable picture of strength and self-reliance, every feather which clothed its powerful form lying unruffled in its place; its white head and tail cut off, as it were, from its trim, compact body, its yellow shanks and toes and corn-colored bill-hook were in sharp contrast with the plumage and the darker polished talons; while those restless yellow eyes in the male showed that no one was trusted, and as plainly in his mate that from no one would any nonsense or interference be tolerated. With the glasses we could count the flick of the "third eyelid" or nictitating membrane which, as in the case of the Eaglets, registered from 17 to 23 per minute.

When two Eagles are perched together one is often leisurely engaged in making its toilet while the other stands guard; it goes

over all its feathers, routing the loose ones, and perhaps drops one wing and then the other the more effectively to comb out the long quills with its bill, precisely as we shall see the Eaglets doing at the nest; the operation often ends by erecting and shaking the feathers of the body so as to permit each to settle nicely into place. Such exercises are apt to be broken by frequent pauses, when the bird comes suddenly to attention, casts an eye about and at her mate, whose vigilance is never for a moment relaxed. If you use a glass you will see that the guarding bird is not quite as motionless as it seemed for its head is constantly turning either way through an angle of one-hundred and eighty degrees; on occasion a glance is cast to the sky overhead, and no moving object is ever likely to enter the range of its vision unperceived. Towards the close of their life in the nest the Eaglets become almost equally responsive to their surroundings. I was once much impressed after one of them had suddenly cocked its head and gazed directly into the sky, for upon drawing back the canvass of the tent, an old Eagle was seen circling half a mile or more above the nest.

I was surprised at the time spent on the perches, and am convinced that often the Eagle's working day did not exceed three or four hours, a circumstance to be taken as good evidence of the abundance of food. We endeavored to follow the movements of individual birds as closely as possible throughout the day, noting when one took a given perch, left it and returned to it again. The following incident will show to what remarkable lengths the apparent immobility of a perching Eagle, when alone, will sometimes extend: as I approached the grove in going my usual rounds one morning towards the end of June, the female left the tall east perch and flew to the lake while her mate, as was afterwards found, was standing guard on the south fork. Though in all probability not unperceived, I managed to enter the tent without disturbing him, and at 8:45 A. M., examined him carefully with the binoculars, noting particularly his position on the forked branch as he stood facing a light breeze from the south; the glasses were turned on him repeatedly in the course of the forenoon, and he was still standing there at twelve o'clock when I was relieved for lunch: for three and one half hours he had not

apparently moved and had not been seen to lift even a foot. I might add that we were then in the midst of a very uncomfortable hot-wave which later sent both birds to the shade. It drove them from the tree-top to the branches below, but so far as we observed in only one tree, that called the "Tall East Perch," which had a horizontal limb about forty feet from its top from which, as later events clearly showed, the nest was visible.

Although it seemed probable that one of the Eagles might occupy the nest-perch for the night, or may have done so at an earlier time, we never found either there after dark. Following a night spent in the tent, on the morning of June 28, at 4:58 o'clock, ten minutes before sunrise, we saw the female Eagle take the south fork; as the sun was rising she moved over to the tall east perch, rested an hour longer and at twelve minutes after six made her first sortie of the day. She had undoubtedly passed the night in the grove and not far from the south fork where she appeared just before dawn.

The heat and humidity to which I have referred, aside from causing the Eagles old and young, to gape as if panting for air, the common response seen in many of the higher animals, or driving them to shade when this was available, produced what we may call the "heat-reflex" (See Pl. XXV.), which is clearly a signal of distress. It is not to be confounded with another reflex, also evoked by heat, that may prompt a bird to spread its wings in order to enjoy a sun-bath.[1] It is a direct response to rather intense heat and perhaps humidity combined, and takes the form of a complete relaxation of those muscles which hold the wings folded against the sides of the body; the wings are not fully spread, as is often the case in sun-bathing or in drying off after a wetting. If the bird is perched both wings droop, and hanging as far down as the force of gravity and the tension of relaxed muscles permit, give it a decidedly odd and languid appearance. At 8:30 A. M., on June 22, the fifth day of the hot wave, when our thermometer, though the sides of the tent were raised, registered 100°, the female Eagle was trying to hold to her high perch, but had both wings down and was later driven to the shade of the branches below.

[1] For a notice of this reflex, see 'The Home Life of Wild Birds,' 2d. Ed., p. 178.

The Eaglets at the nest rather frequently showed the same response in the hottest part of the day, and I have seen one of them hold this position for two hours at a stretch gaping much of the time. When this altitude is assumed upon the eyrie, the wings swing slightly outward, and resting upon their outer margins expose the whole under surface of the body to the air.

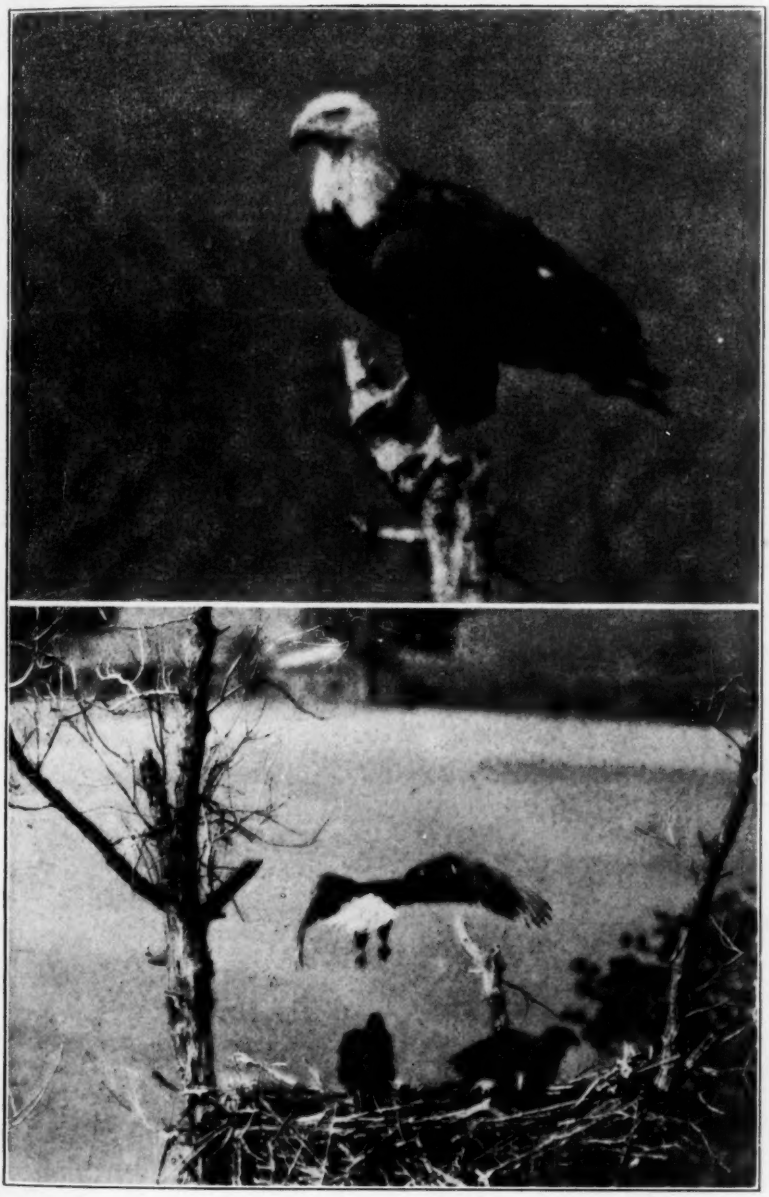
I have seen an Eagle in captivity take a pose somewhat similar to that just described, the wings being relaxed in such a way that the angles stood well out and their long tips hung down and crossed over the tail; a Screech Owl also, which I had alive for a number of days, when perched, would sometimes drop one wing at a time and let it hang, completely relaxed at the side; since this was in cold weather it may have been merely the result of fatigue.

When standing listlessly on the perch the Eagle will occasionally execute a very good yawn, and like the Hawk is given to standing on one leg, the other with toes clenched being drawn up under the feathers; or, like the Hawk also, when thus standing he will lower the other leg until its shank or heel comes to rest on the perch. After feeding, the Eagle usually cleans its bill by rubbing it on any stick or branch at hand, and when busy either with feeding or preening it may be seen to pause for a moment to scratch its head with its claw.

III. THE NEST-PERCH.

The adoption of the "nest-stub" or perch in 1923 altered in important ways the polity of nest-life, as by holding one of the old Eagles at the eyrie for a considerable part of each day, and by making the young content to remain in it after they had proved their ability to fly; and incidentally, on more than one occasion, it brought the whole family together at dinner. For a time the Eaglet seemed to derive the same satisfaction from hopping on the nest-perch as from an independent flight to a distant tree.

After the delivery and service of food the usual course of an old Eagle, when its behavior was free, was as follows: to fly up to the stub, which projected about three feet beyond and above the far side of the nest, clean its bill, and begin a period of guard-duty which might last from two minutes to two hours or longer,



1. FEMALE EAGLE IN GUARDING ATTITUDE ON NEST PERCH.
2. SAME BIRD SHIFTING TO TALL EAST PERCH; FEET WERE DRAWN UP A MOMENT LATER.

UNIV. OF MICH.

BILL TO BILL FEEDING BY FEMALE, STANDING ON FISH AND PASSING PIECES TO YOUNG. FIVE FOOT STICK IN FOREGROUND WAS A PLAYTHING FOR THE EAGLETS.

UNIV. OF MICH.

according to conditions which could not always be fathomed. Very rarely they would drop back to the nest for a second course of food and again return to their post; on one occasion the female remained on the perch while fish were twice brought and served by her mate. If the time spent on the nest-perch was brief they would usually go to another perch in the grove, or if extended, would sally forth direct to the fields or the lake for their quarry. The preening and all other activities noticed on the tree-perches were observed here and of course to much better advantage.

The following incident will illustrate the tenacity with which an old Eagle would sometimes hold to its perch at the nest; at 5:30 P. M., on June 22, the female landed a fish and took the nest-perch at once; standing there, erect, her head constantly turning either way she keenly surveyed her nest and the whole situation; an hour passed, but she had not changed her position nor so much as raised a foot. She then ventured to make her toilet, coming frequently to attention in the process, yawned, turned an eye skyward and resumed her usual guarding demeanor. A railroad train thundered past, but such sounds were beneath her notice. At 7:30 P. M., she appeared to have settled down for the night and to have made her supper, while mine was overdue; not wishing to show myself on the platform I tried to frighten her off, at first by shouting and then by pounding with a hammer, but it was three minutes before she finally moved, and then only to take her favorite position on the tall east perch.

In tabulating our records of 60 visits to the nest from June 15–30, 1923, (See Table I.), I find that the nest-perch was taken 43 times, and that the time spent on the nest itself tended to increase, while that passed on the perch showed little change. The total time spent by both birds upon their eyrie, when they might be feeding on their own account or serving the young was one hour and forty-three minutes, while the aggregate time passed upon the stub over the nest was eight hours and twelve minutes. The adoption of the nest-perch by the Eaglets with the result of prolonging their stay in the nest at the close of the season will be noticed in a later section.

IV. RECONNOITERING.

When an Eagle has done guard-duty on a tree-perch for an interval, whether long or short, and the spirit moves him, he is likely to inspect the nest before leaving for a foray in search of prey. He flies past the nest, twenty-five feet or more to one side and one hundred feet or less beyond, before making off direct to the fields or to that great reservoir of their food, the shore and surface waters of Lake Erie.

By "reconnoitering" I mean making a tour of inspection of the eyrie without coming in contact with it; it might take them casually over it at a considerable height, or even completely around it, when they would fly between tent and nest, and the greater the anxiety of the old birds for the safety of their young the more frequent did such sallies seem to become. More than once we have seen an Eagle, as if for assurance, leave its tree-perch, encircle the nest and return to the point it had left but a moment before. In making such a reconnaissance from the tall east perch we have seen an old Eagle describe a figure eight, the nest being enclosed by the loop nearest the perch. The common habit on leaving this post was to fly past the far side of the nest, wheel and go direct to a different perch. Only once or twice have I known an Eagle to break its habitual silence on such occasions by giving a piercing scream as it passed its young.

While the mighty Eagle was thus sailing about its eyrie it was often attacked by the plucky little Kingbirds; and whatever ideas we might be inclined to read into some of the acts, described as "assurance," "anxiety," "welfare" and the like, there can be no doubt that pursued and pursuer were here impelled by similar instincts,—the little monarch to guard his home-territory, on which his nest was placed and the big one, his young, which command his daily care for upwards of ten weeks.

These reconnoiters, or little journeys to the vicinity of the eyrie, evidently correspond to those visits of inspection to the nest itself, which Macpherson[1] found common in the late nest-life of the Golden Eagle in Scotland, especially by the female,

[1] See Macpherson, H. B., 'The Home-Life of the Golden Eagle.' London, MCMIX.

who never stayed long, however, except when feeding or sheltering her young. It should be added that such visits might also be made for cleaning the nest, an act which I have never witnessed in the American bird. Out of 49 visits recorded in 1922, four were entered as "empty-handed" or more properly "empty-footed" because we saw no evidence that food or any other object was delivered, and my first idea was that the birds had come to the eyrie as to a common dining table to feed. In the following year when the conditions for exact observation were much improved, out of 60 visits not one was of this character. It is therefore safe to say that at this late phase, barring activities which center about the nest-perch, contact with the eyrie is seldom made except for the purveyance of food. Perhaps we shall find that in the white and early gray down-stages the practice is somewhat different, and I can well believe that a hungry bird might repair to the nest when too indifferent or too indolent to go to the primary source of supplies. At this stage then, reconnoitering takes the place of visits of inspection to the eyrie itself, but it may be also brought into play for a very different purpose, as will be shown in a later section.

Guarding the nest is an instinct, the urge of which rises and falls according to the varied experiences of the day or the hour, and even of the moment. Just as sight of an Eagle arouses the fiery pugnacity of the Kingbird, so events which transpired on the ground, and of which we could not always be cognizant, affect the Eagle whether at rest or in action. On certain days they would leave their tree-perches without troubling to inspect the nest, and we then knew that behavior was free and that all was well. This is illustrated in the following by no means unusual record: at 4:30 P. M. both Eagles occupied a common post, but five minutes later the female moved up to the tall east perch and after a rest there of twenty minutes, started off to the lake with a small Hawk in pursuit. The male, after having spent an hour and a quarter at his first station, at 5:45 P. M., moved up also and took the place lately vacated by his mate; after a further respite there of twenty-five minutes he also flew to the lake. At half after six o'clock the female returned with a fish and after landing it on the eyrie took the nest-perch; resting there but five minutes she re-

turned to the tall east perch from which she had been absent forty-five minutes, and when we closed our tent at seven o'clock the male had not returned. Here we see a series of simple events, which are more or less chained or interdependent, and illustrate the normal aquiline activities which are centered at this stage about the nest. Where, as in this case, the urge of hunger was to all appearances stronger than the impulse to guard the young, they may be deserted by both birds, though never, so far as we have observed, for any great length of time.

V. FOOD-HABITS.

In the question of its food the American Eagle is as adaptable as in all other matters, for its one rule is to live off the country and to take whatever its hunting territory affords. Since the Eagle is inordinately fond of fish it was no surprise to find that the Vermilion birds drew their sustenance almost wholly from the great storehouse close by their door. In 1922 seventy per cent of the food, delivered at the eyrie, and in 1923, ninety-six per cent for the period in question consisted entirely of fish. The number of visits, totalling 109 for these two seasons are summarized, and those of 1923 recorded in detail in Tables I–II. Out of those 109 visits food was brought 102 times, and in this task the female was nearly twice as active as the male. The daily number of such visits varied from 2 to 8, and averaged nearly 4 per day in 1923. Although the feedings may be exceptionally bunched at almost any time, three or more coming in rapid succession, or may be scattered through the day, they were on the average about twice as numerous before 9 A. M., and after 3 P. M., as at any other time. If we divide the day into four periods,—5–9 A. M., 9 A. M.–12 M., 12 M.–3 P. M., and 3–7 P. M.,—in 105 recorded visits the proportion was 36-20-15-24.

TABLE 1. FOOD-HABITS OF AMERICAN EAGLE. DAILY RECORD OF VISITS TO EYRIE.

No.	Date	Time	Bird	Material delivered	Time at nest	Time on Nest-perch in min.	Recon-noiters	Observa-tion period
	June							
1	15	**6.20**	?	Fish	5–10 s.	5		9.25–11.30
								3.00–7.00[1]
2	16	5.56	?	Oak-leaves	5 s.	27		(6 h. 5 m.)
3		6.29	♀	Small pike	1.5 m.	19.5		
					10 m.	25		
4		7.51	?	Small cat-fish	3 m.		8.05	
							9.25	
5		11.25	♀	Fish	5 s.	63		
6		**4.10**	?	Small fish	5 s.	2		
7		**5.03**	?	Small pike	5 s.	2		
8	17	11.50	♀	Fish (?)	5 s.	5	11.45	5.05–**5.50**
								(12h. 45 m.)
9		11.58	♀	Fish	5 s.	15		
10		**1.13**	♂	Small fish	2 s.			
11		**2.12**	♀	Sheeps-head	2 s.	2		
12		**2.37**	♀	Fish	3 s.	11		
13		**2.50**	♂	Small perch	5 m.	2		
	18						**1.30**	5.05–10
								1.30–2
								(6 h. 25 m.)
14	19	10.14	?	Large fish	3 m.		10.49	5.03–**4.15**
								(11h. 12m.)
15		10.50	♀	Large fish	2–3 s.	2		
					5 m.	60		
16		10.53	♂	Fish	2–3 m.			
17		11.25	♂	Fish	1.5 m.			
18		**3.48**	?	Fish	1–2 s.			
19	20	5.39	♀	Fish	2 m.			5.05–**7.00**
								(13h.55m.)
20		8.55	♀	Fish	1–2 s.	3		
21		9.08	♀	Fish ?	1–2 s.	2–3		
22		**1.04**	♀	Fish	1–2 s.	2		
23		**2.00**	♂	Small fish	1 s.	1		
24		**6.44**	♀	Fish	4 m.			
25	21	**1.35**	♀	Fish	½ m.	1.5	**2.01**	5.06–**7.35**
							4.23	(14h.15m.)

[1] Bold face type indicates P. M., light face A. M.

TABLE 1. (*Continued.*)

No.	Date	Time	Bird	Material delivered	Time at nest	Time on Nest-perch in min.	Recon-noiters	Observa-tion period
26		**4.34**	♀	Fish	1–2 s.	4		
27	22	7.41	♀	Small fish	1–2 s.	1		
28		8.52	♀	Small fish	2–3 s.	3		
29		9.48	♂	Fish ?	3–5 s.		10.23	
							11.35	
							11.47	
							12.58	
30		11.53	♂	Fish	1 m.			
31		**1.19**	♀	Fish	1 m.	6		
32		**2.01**	♂	Fish	2–3 s.	2	**2.32**	
33		**2.27**	♂	Large fish	1 m.	4		
34		**5.30**	♀	Fish ?	2–3 s.	120		
35	23	**12.57**	♀	Fish	2–3 s.	4	5.10	4.57–**7.48** (14h.45m.)
36		**6.07**	?	Fish	¼ m.			
37	24	5.54	♀	Small fish	2–3 s.	2		5.05–**3.45** (10h.40m.)
38		7.04	♀	Fish	2–3 s.	3		
39		7.12	♀	Fish	2 m.	2		
40		7.21	♂	Fish	11 m.	11		
41		**3.35**	?	Fish ?	?	?		
42	25	6.14	?	Small fish	1–2 s.	1		5.06–**7** (13h.54m.)
43		7.13	♂	Small fish	7 m.	3	10.12	
44	26	6.50	?	Fish	2 s.	2	11.12	5.04–**7** (13h.56m.)
45		**3.24**	♀	Fish	1–2 s.	11		
46		**3.43**	♀	Large fish	4 m.	8		
47		**4.53**	♂	Fish	2 m.	28		
48	27	5.50	♀	Small fish	1 m.			5.10–**7.50** **10.25–12** (16h.35m.)
49		7.28	♂	Small fish	14 m.	3		
50		**5.42**	♀	Fish	1 m.			
51	28	6.40	♀	Fish	½ m.	34.5	6.53	1–**5.05** (17h.5m.)
52		6.58	♂	Plover ?	6 m.			
53		**4.04**	♀	Fish	1–2 s.	2	**4.25**	
	29						5.18	5.20–**6.30**
							8.18	(13h.10m.)
							4.25	

TABLE 1. (*Continued.*)

No.	Date	Time	Bird	Material delivered	Time at nest	Time on Nest-perch in min.	Reconnoiters	Observation period
54		**4.36**	♀	Fish ?	2-3 s.	4		
55		**5.09**	♂	Fish	2-3 s.	2		
56	30	5.55	♀	Large sheepshead	1 m.			
57		7.30	♀	Fish	1.5 m.			
58		8.43	♀	Chicken	5 m.	5		
59		**6.15**	♂	Large sheepshead	1 m.			5.50-**7.30** (12h.30m.)
60		**6.57**	♂	Small fish	12 m.			

TABLE II. SUMMARY OF FOOD-RECORDS AND OTHER ACTIVITIES: 1922-1923

	1922	1923
Observation period	June 13-July 4	June 15-July 1
Total time	21 days (215 hrs. 4 min.)	17 days (205 hrs. 36 min.)
Average daily observation-time	10.7 hrs.	12.8 hrs.
Daily period of expected aquiline activity	13.7 hrs. (5.20 A. M.- 7. P. M.)	12.8 hrs.
Total number of visits to eyrie:	49	60
By male		15
By female		28
In doubt		17
Average number of visits with food for 13 days, when observations extended to 10 hours or more per day	2.5	4.
Greatest No. of visits in single day	6 (June 19)	8 (June 22)
Greatest No. of visits with food in single day	5	8
Earliest and latest visits with food recorded	5.24 A. M.: 6.42 P. M.	5.39 A. M.: 6.57 P. M.
Reconnoiters without food	20	15

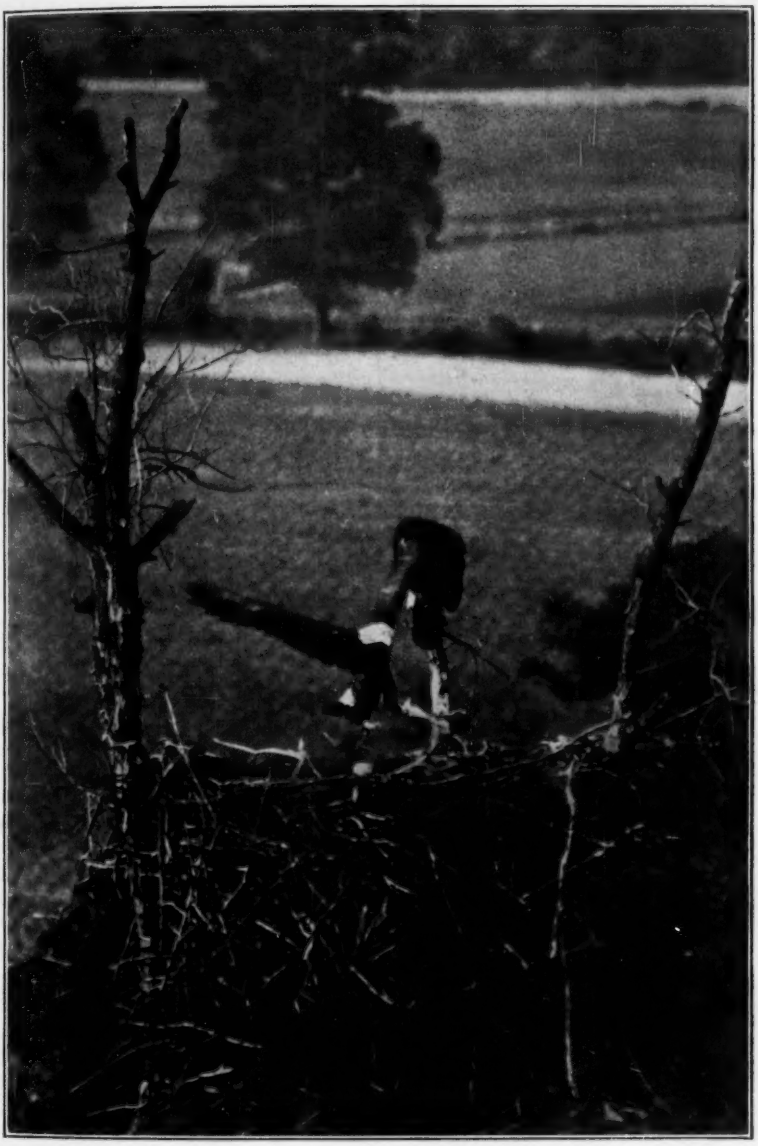
TABLE II. (*Continued.*)

	1922	1923
Reconnoiters with food	4	0
Analysis of food brought:		
Fish	30—certified, 27 inferred, 3	57—certified, 52 inferred, 5
Chickens	12—certified, 7 inferred, 5	
Other food	1	1
Visits with materials other than food (green leaves or stubble)	2	1
Empty-footed visits	4	0
Records of last full day:		
Visits to eyrie	0	5
Reconnoiters	4	0
Reconnoiters with food	3	0
Record of last day:		
Reconnoiters with food	1	0

Remarks: Total number of visits recorded, 109; total observation-time, 38 days: In 1922, when there was no "nest-perch," the flight of the first Eaglet occurred after 12.30 P. M., July 2, and that of the second at 5.15 A. M., July 4. The second Eaglet was starved out, having received no food for 4 hours, and was finally lured away by successive reconnoiters by the old birds, the food being showed but not delivered.

In 1923, when a nest-perch had been made available, and had been adopted by old and young birds, there was no luring or starving of either young. Eaglet No. 1 left on June 27 and returning on the 29th, remained 27 hours to depart finally on the thirtieth. The second bird made its first flight from the nest at 5:30 A. M., on July first.

The food as delivered consisted of 87 fish (certified, 79; inferred, 8); chickens, 13 (certified, 8; inferred, 5), and a small animal, possibly a Plover. On four visits, described as "empty-footed," nothing whatever appeared to be brought to the eyrie. Among the fish, which were of various sizes up to a possible weight of 3 or 4 pounds, and in any case often lacked the head, we recognized the lake and common catfish, sheepshead, sand and blue pike, carp and perch,—all common forms which can be found almost any day, and in great numbers after northerly storms have cast them up on the beach. All the larger fish and other objects were carried well down in both talons but often the wary and more



MALE BRINGING IN LAST FISH ON LAST DAY OF EYRIE LIFE, JUNE 30, 6:57 P. M. WHITE OBJECT IS A SHEEPSHEAD BROUGHT ON PREVIOUS VISIT.

UNIV. OF MICH.

1. EAGLETS WITH WINGS DROOPING FROM HEAT.
2. EAGLET STRETCHING WING; LEG ON CORRESPONDING SIDE IS NOT RAISED.

UNIV. OF MICH.

timid male would enter the eyrie with a ridiculously light load, represented perhaps by the tail-end of a fish held in one foot. (See Pl. XXIV.)

The Eagles were often seen perched on poles where the fishermen had strung their nets far from shore, and are regarded by them as poachers. They must also be credited with the ability of submerging and on occasion of taking their prey from the water alive as will be noticed later, but I have never seen the Vermilion Eagles immersed, and am confident that their regular habit was to search the surface for floating dead fish or to resort to the beach.

The chickens brought to the eyrie were commonly white, to judge from the few remaining feathers, and of broiler size; these were always plucked nearly clean, and as with the fish they were often lacking the head. The farmers naturally resent the loss of their chickens, and are commonly sworn enemies of the Eagle in consequence; but when we consider the wide area over which these birds range in the course of the season, and the relatively small number of domestic fowl destroyed, only one in sixteen days in 1923, it is evident that individual losses are bound to be small.

Mrs. F. E. Ranney, who is well acquainted with these Eagles, told me that one day as she happened to be looking out of a window on a strip of land where a number of white chickens were running about, an Eagle suddenly appeared, flying low; her husband, who was standing near, remarked: "Now watch him! He is going to get a chicken!" No sooner said than done, for at that instant the Eagle stooped, selected his bird, and pausing only long enough to strike its talons into its vitals bore it off to the woods. The Eagle was not so successful when Mrs. Buehring happened to see the wings of a large bird flapping above the top of a knoll near her house; the raptor who was found to have one of their fowls in its grasp and was pulling out the feathers, was promptly driven off; when he arose, he left an amazing trail of white feathers behind him, and although the rescued fowl hastened to join the flock it was mortally wounded and did not long survive.

The American Eagle is often credited with being excessively shy, and Macpherson says of the Golden Eagle in Scotland: "of all our shy birds the Eagle is the most timid," yet as I have explained in an earlier paper such judgments ignore certain vari-

able factors of which experience is of the first importance. Under certain conditions Eagles become very bold when they not only venture to approach buildings but even to pick off a lamb or a chicken under the farmer's very eyes. The Danbury Eagles' nest, which I have already described,[1] stood in the top of a dead shell-bark hickory, on the edge of a grove, about a quarter of a mile distant from the buildings of the owner; according to the story which was told me by the farmer's son, shortly before our visit on July 5, as he was feeding the chickens close by the house, one the Eagles appeared, flying very low as if headed for the orchard; but of a sudden it swerved, stooped to the ground, and picking up the one stray member of his flock not forty feet from where he stood bore it away to the nest.

We have seen the Eagles at Vermilion feeding regularly on the dead fish which are swept on the shores of the lake; their preference is undoubtedly for living prey, but like all raptors they take readily to carrion when nothing better is at hand and in this respect perform a useful service. Our Eagle also accounts for large numbers of waterfowl and of more or less destructive mammals, as rats, squirrels, rabbits, raccoons, skunks and opossums. Though too fond of domestic poultry, and in certain cases of mutton chops and suckling pig to ever become popular in farming communities, such depredations are rather exceptional and scattered over a wide area. It is probably true that under certain conditions all small mammals and the young of the larger ones are subject to attack.

The Eagle, though devoting most of his day to idleness when the living is good, is capable of prodigious and long sustained exertion, of prolonged fasts and exposure to intense cold; and, having intelligence enough to learn from experience to avoid his enemies, he can adapt himself to almost any conditions. The numerous records relating to depredations of both the American and Golden Eagles in different parts of the country, particularly among young pigs and lambs, prove that these birds are capable of lifting considerable weights. Cameron[2] records a case of a Gol-

[1] See "Nests and Nesting Habits of the American Eagle," 'The Auk,' Vol. XLI. April, 1924.

[2] E. S. Cameron. "Nesting of the Golden Eagle in Montana." 'The Auk,' Vol. XXII. Cambridge, 1905

den Eagle in Montana carying off a lamb, and J. E. West[1] saw a Bald Eagle alight at the mouth of Neuse River, N. C., with a small lamb in its talons. Cameron also speaks of the Golden Eagle carrying a Jack Rabbit which weighed 7 pounds and he thought that 18 pounds, the weight of a large jack rabbit, might represent the limit of the bird's carrying capacity. This however I believe to be far too high and that when such large animals fall into the Eagle's clutches they are divided before being taken to the eyrie as Macpherson's careful and detailed studies clearly showed. At Danbury, Ohio, Mr. Tibbels once saw the White-headed Eagle flying very low and carrying a carp which appeared to be larger than the bird itself and to have weighed 6 to 8 pounds.

That the Eagle might seize and carry off a small child is perhaps possible though extremely improbable since it is not likely that this bird can lift a body much in excess of its own weight. The weight of the female Eagle, the larger sex, varies from 8 to 13 pounds, but a bird of 12 or even 10 pounds is exceptional, whereas 10 pounds is not a very excessive weight for the human infant at birth and by the time such an infant is ever likely to come within the range of an Eagle it is bound to be too heavy for it to master. Though it might conceivably be attacked it certainly could not be carried off. It may be doubted if a single authentic case of an unprovoked attack by an Eagle upon a child or an adult has ever occurred in this country, for fabrication in dealing with this matter has become to such an extent a habit that no accounts can be accepted unless based upon verifiable evidence which seems to be invariably lacking. One account is of a boy about five years old at Belleville, Ont., in whose dress an Eagle fixed his talons but was unable to rise with him and was driven off. A somewhat similar incident was given by Alexander Wilson at the beginning of the last century. Both of these however came to their narrators second hand and any one who is familiar with the habits and instincts of the Eagle will readily perceive that at one important point at least, the internal evidence is fatal to the acceptance of either story. When an Eagle stoops at an enemy or at his prey, and is deterred at the striking point, he will immediately rise, and might carry off a cap, as has been known to occur when the attack was upon a

[1] See "Forest and Stream." Vol. IV. New York, 1875.

man who had invaded the nest, or "a fragment of a frock" if a child were assailed; but whenever he strikes in earnest and endeavors to master his prey and rise with it in the air, as is said to have been the case in the instances given above, his action is very different. His aim then being to maim or kill, the Eagle instantly drives his talons with all his power into the body of his victim. If danger is scented he will make every effort to lift his prey bodily from the ground and bear it to a place of safety; but if the place and time are propitious he tries to finish the business on the spot by repeated thrusts of beak and claw, often "treading" his quarry, until its vitals have been reached and resistance is at an end. It is evident that an Eagle, with claws nearly two inches long, or more if measured on their curve, could not strike a child of whatever age and strive to bear it away, without the certainty of inflicting grievous injuries, irrespective of the success of his efforts.

The following remarkable experience of Mr. Turner Turner, sportsman and amateur fur-hunter of British Columbia, was given by Mr. C. J. Cornish,[1] in 1899, belongs in another class and so far as I am aware it is unique in aquiline literature. In this case the attack was made not by the American but by the Golden Eagle, and in the open, not near its nest, when the ground was covered by six inches of snow on which a man was a conspicuous object. "Presently I was surprised," he said, "to see how close the bird was approaching, but concluded that it must have mistaken me standing still for a stump and would immediately discover its error. It never deviated from its course or changed its position (*sic*), except to drop its legs slightly when about ten yards off, and in line with my head. These it quickly drew up again, flying directly at my face, which so took me by surprise as to leave me hardly time to throw up my rifle as a guard, and to wave my left hand. This caused the Eagle to pass above me with the rush of half a dozen rockets. Up to this time the thought of harming the bird never occurred to me. But I then faced about and fired at my retreating foe. Then with a rapid wheel it turned to renew the attack, this time making an undoubted and intentional stoop at my head, in which it would have been successful had I

[1] See "Eagles and their Prey," 'The Cornhill Magazine,' Vol. VII, N. S., London, 1899.

not suddenly ducked." It was thought that the Eagle, which was subsequently shot, was aiming at the eyes, the most vulnerable parts, seeing in the man only an animal which it could thus blind and have at its mercy.

That the Eagle can be amazingly swift or deliberate, as conditions demand, in securing its prey, was well illustrated by two incidents which occurred at Vermilion. In the spring of 1922 a man was ploughing with a tractor close to the Eagles' tree, all unconscious no doubt of the keen eyes which were watching him from a perch in the grove. Suddenly he started a rat which began running for dear life along the furrows; and at almost the same instant the Eagle shot from his lofty perch with the speed of an arrow, picked up the astonished rat in his talons, and under the eyes of the equally astonished ploughman promptly bore it to its eyrie. The other incident occurred early in June of last year; the male Eagle had taken the favorite tall east perch, which commanded the region very fully, at forty minutes after six o'clock; ten minutes later, when he seemed to have detected a moving object amidst some growing corn, upon which we looked directly down from our elevated station, he left the perch and flew past the nest; then, instead of moving off to the lake, according to his usual schedule, he dropped down over this field, and began to circle about it; slackening his speed as if in an effort to cover every part of the field in his search, he gradually contracted his circular path, as he descended nearer and nearer to the ground, until with elevated wings he came to rest very gently upon the brown earth. With the glasses we could see that he had struck his quarry, and for some minutes he stood there treading it with his feet, and could be seen to bend down and apply his bill-hook, the white head of the bird alone marking the spot where its brown body seemed to melt into the dun earth. Then, as deliberately, he rose and came to the nest bearing in his talons the prey which was small and mutilated beyond all recognition. Since Kildeer Plovers were nesting in that field one of their young was possibly the victim.

At Danbury, Ohio, according to Mr. Tibbels, many Eagles resort to East Harbor in autumn to pick up any stray waterfowl, particularly Coots and Ducks, which have been crippled by hunters, and where, if successful, they will often spend the day standing

about for hours on the ice; in spring they may be seen there also around the open pools, where wounded Ducks have been impounded and where they often vainly attempt to escape by diving under the ice.

According to Mr. Dale Bonnycastle[1] the American Eagles congregate in great numbers in spring on the sand-spits and tide-flats of Denman's Island in the Straits of Georgia, many remaining to breed; and he speaks of seeing one hundred and twenty of these great birds "feeding, circling and screeching" along seven desolate miles of that coast. Though not a plunger or strictly a diver, yet the Eagle was able to take many fish alive with little wetting of his plumage. Their duck-hunting was quite wonderful; an Eagle, according to this observer, would sit well concealed in the bushy top of a fir; a flock of Bluebills or American Scaup may be swimming along shore, and the moment they enter water not over a foot deep they are doomed; the Eagle shoots from his hiding place; the Ducks dive and circle back and forth under the water in vain; the Eagle follows every turn of his chosen bird, which after swimming under water for a minute rises only to fall into the Eagle's talons. "A venturesome Crow that picked up a cockle and flying a few feet in the air, dropped it on a rock, was driven away from the neatly opened shell by an adjacent Eagle." They picked up every bit of edible flotsam, said Mr. Bonnycastle, and not a single fish taken by the Osprey or by a Hawk ever reached its "interior department."

The habit of the White-headed Eagle of pursuing the Osprey and compelling it to drop the fish that it has just caught which is then recovered by the Eagle before it touches the water, is well known, but the Eagle has been recorded also as doing his own fishing. Hardy[2] describes one which descended in a spiral over the Penobscot River, Me., "then taking a wide circle he suddenly darted down obliquely and stretching forth both legs to their full extent he trailed them for several feet along the surface; finally making a quick thrust with the right foot and seizing a small fish near the head, he bore it away." Audubon[3] also mentions

[1] See 'Country Life,' Vol. XV. New York, 1909.
[2] 'Bull. Nuttall Ornith. Club,' Vol. VIII, p. 242. Cambridge, 1883.
[3] Op. cit., p. 163.

having seen our Eagle taking red-fins alive in the Perkiomen Creek, Pennsylvania, "by walking briskly through the water, and striking at them with his bill."

At Cobb's Island, Virginia, as reported by Brewster[1], Brant and Geese once formed the principal food of the Eagles: "when close upon its quarry the Eagle suddenly sweeps beneath it, and turning back downwards, thrusts its powerful talons into its breast. A Brant or Duck is carried off bodily to the nearest marsh or sand-bar, but a Canada Goose is too heavy to be thus easily disposed of. The two great birds fall together to the water beneath, where the Eagle literally tows his prize along the surface until the shore is reached. In this way one has been known to drag a large Goose for nearly half a mile." Mr. Brewster also noted that more than once the keen eyes of the Eagle had been deceived, when he had approached the "stools" or wooden decoys of sportsman, lifted them from the water and carried them a number of yards before discovering his mistake.

There is an account of a White-headed Eagle at Little Rock, Ohio, pursuing Geese on the White River in plain view of passengers on a ferry boat. He would strike a bird but was unable to rise with it and the Goose by diving dragged the Eagle in the water and forced him to relinquish his hold. Other Geese were then struck with the same result.

Batchelder has described an Eagle on the St. Johns River, Florida, attacking Coots (*Fulica americana*). So long as they remained close together they escaped but finally separating the flock, the Eagle pursued a single bird until he secured it, once following it under water when it dived and remaining for some seconds and finally emerging with the Coot in his talons.

The Eagles have often been seen to drive Vultures from their prey and when food was scarce to even attack them and compel them to disgorge. Audubon describes an Eagle driving Vultures away from a dead horse and pursuing one which had a piece of the entrails dangling from his bill, finally killing the bird and devouring the morsel.

The question has often been raised whether birds ever designedly come to the aid of a companion in distress, and has often been

[1] 'Bull. Nuttall Ornith. Club,' Vol. VI, p. 122.

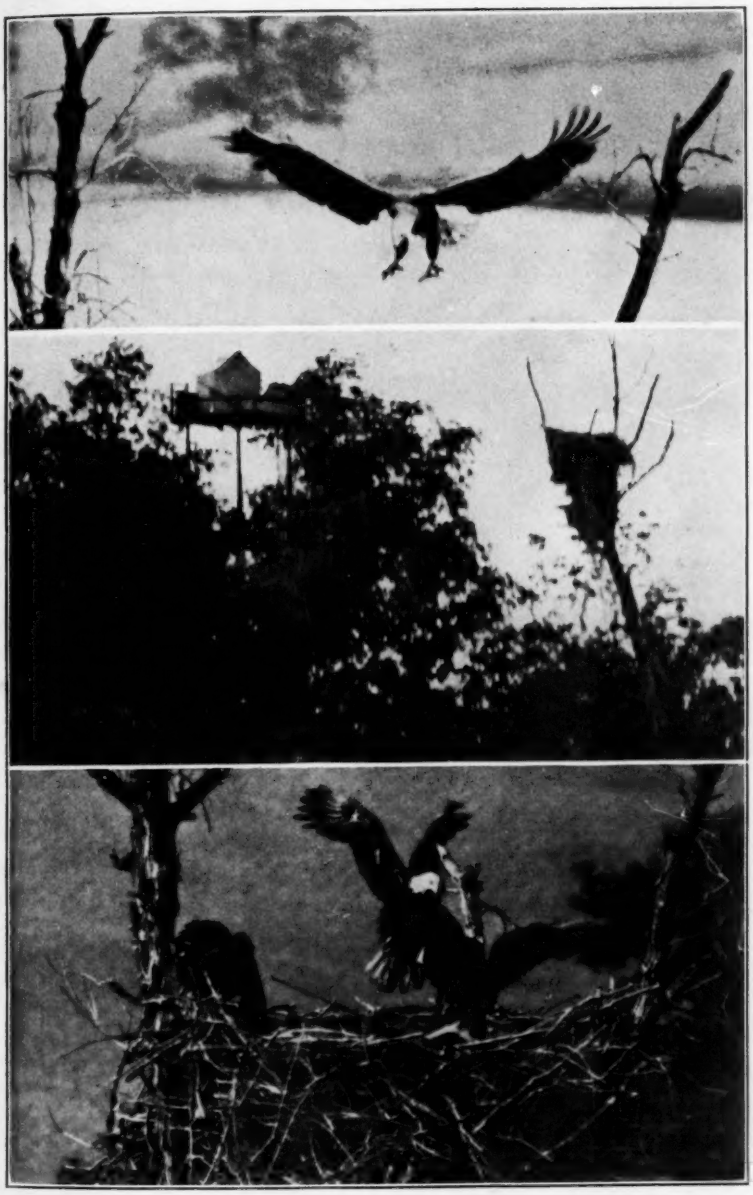
answered in the affirmative, as in the incident which follows:[1] according to this reporter, one of four Eagles was wounded on the marshes of Green Bay, Wisconsin, and lay fluttering on the water, but before it could be reached its three other companions had come up to it, and catching hold of its wings did their best to carry it off; they managed to drag it a considerable distance, which the writer thought "showed their friendly intentions just as well as if they had succeeded in flying off with it." On the other hand, knowing how weaklings and cripples are treated among domestic fowls and many gregarious animals, and that a young Eagle has been known to perhaps kill and certainly to eat its nest and cage-mate, as occurred in the case which I reported at Danbury, Ohio, in 1921, we might raise the question whether such actions on the part of this wounded bird's companions, as noticed above, were really as friendly as at first sight they might appear.

Macpherson states that on one afternoon, when a young Golden Eagle was about three weeks old, three Grouse were brought to the nest inside of five minutes, two by the female and one by the male, while a little later the male delivered a fourth, all of these birds having been previously plucked according to the usual habit. It was later found that the Eagles had accumulated a store in a steep rock close to their eyrie, which accounted for such quick returns. It was also found that during the first two months of nest-life the eyrie was kept remarkably clean, all the discarded carcasses, castings of the Eaglets and other refuse being scrupulously removed by the old birds and deposited in a definite place, which was not the same as that used for plucking or caching their prey.

At Vermilion we once had three deliveries of fish in the course of 17 minutes, between seven and eight o'clock in the morning, but there was no evidence that the food was ever cached, and nothing was removed from the nest from at least the second week in June until the young were on the wing. At a little later time, however, the accumulated refuse of many weeks was pretty generally cleared away.

A journey in air-line from the Vermilion nest to the beach of Lake Erie and back is approximately two miles, but as the Eagles

[1] 'Bull. Nuttall Ornith. Club,' Vol. VI, p. 122.



1. EAGLE FLYING OVER WITHOUT PREY IN TALONS.
2. RELATIVE POSITIONS OF OBSERVATORY AND NEST.
3. FEMALE BRINGING IN FISH JUNE 20, 6:44 P. M. NOTE DIFFERENT RESPONSES OF EAGLETS.

UNIV. OF MICH.

were apt to go out far from shore, or for a mile or more either way along the beach, their average trip for fish could have been hardly less than three miles. The following record, made on June 17 when the identification of sex was positive, will illustrate the speed with which the Eagle can sometimes accomplish the business in hand. When first observed both birds were on the tall east perch; at eight minutes after two o'clock the female flew northwest to the lake, and in 4 minutes was back at the nest with a large sheepshead, 12–14 inches long; two minutes later, or six minutes from the time she left her mate she was again at his side. Eighteen minutes now elapse, when at 2:32 P. M., the same bird makes another sortie, again going northwest to the lake, and in five minutes she has landed her second fish; and after delivering this she hops to the nest-perch and begins a period of guard-duty there. No sooner is the female well settled at this post than the male, at 2:40 P. M., jumps off the tall east perch, and makes direct for the lake; and now the female, having doubtless sensed her mate under way to the eyrie, once more returns to the favorite lookout point which he had just abandoned. Two minutes later, or ten minutes from the moment of starting, the male has landed his fish, but being both hungry and suspicious he wavers for fully four minutes, while the struggle of competing impulses goes on within him, cautiously peering about before venturing to feed. Finally, when fear has been vanquished in the struggle, having planted one foot on the fish, he ripped up its belly with a swift stroke of his bill, ate most of the entrails, and after opening up the gills began work at the head; pausing at this point for a moment he picked up the tail-end of another fish and swallowed it. Seven minutes were spent at the nest and nest-perch, and in 19 minutes from the time of leaving it, he was with his mate again at their favorite station. There was now a rest of nearly an hour for both birds; at 3:50 P. M., the female was off for the lake for the third time, and three minutes later the male also made a move, this time going to the south-east perch. Thus when behavior is focussed at the nest and perfectly free, we see the closely related activities of the mated birds proceeding from minute to minute, from hour to hour and from day to day.

VI. GENERAL BEHAVIOR, NESTING SCENES AND SERVICE OF FOOD.

Although it is impossible to divorce the interlocked activities of old and young Eagles at any time, it will be convenient to consider the complex behavior of the Eagle family first, as exhibited in the course of parental visits at the eyrie, and the interesting and often extraordinary activities of the Eaglets, when left to their own devices, in a following section.

After watching the behavior of these Eagles at the nest for many consecutive days and weeks we were not surprised to find that while their actions followed very closely the models which heredity had prescribed, and in a considerable proportion of cases could be predicted with a fair degree of precision, they were rarely, if ever, quite stereotyped at every point; on the contrary, a faithful transcript of what occurred at a number of consecutive visits, was always likely to show variation, and particularly the modifying influence of habit. This should not be surprising when we consider the number of influences which are certain to be more or less constantly at work, such as fear, hunger in both adult and young, and the mutual reactions called forth in an ever changing environment, one and all tending to effect kaleidoscopic changes in those conditions which determine eventual response.

As a rule both birds would approach the eyrie and leave it in absolute silence, and to my surprise it was very seldom that we heard the yelp or alarm-call of the male, which is given by opening and closing the mandibles, as if to bite off each note and at a moderate rate of speed. At any time of day and often at frequent intervals the scream of an Eagle would come to our ears, now from one of the perches close at hand, or from the lake and distant fields, but very rarely when reconnoitering or when actually upon the nest. These wild cries, so far as we could see, were in no way connected with their irregular visits with food for their young. The scream at times seemed to take on the quality of an alarm, although appearances, as in the following incident, may have been deceitful: as we were passing down the lane one morning one of the old Eagles was seen to go to the nest; the other bird was perched in the grove, and the moment we were detected off it went

with a forceful scream, which seemed like a warning note sounded for the benefit of its mate at the nest. These weird enlivening cries, when mellowed by distance, possessed a tone and quality quite pleasing at least to our indiscriminative ears. Towards the close of nest-life, when the young Eagles were alive to all unusual sights and sounds in their immediate neighborhood the parental scream never failed to touch a chord of sympathy, and we daily watched the evolution of this cry in them from a feeble bleat or *cheep* to a thin wiry squeal, which hunger, discontent, or the approach of a parent was always likely to evoke; until, when on the wing, the Eaglet's scream had much the tone and quality of that of an adult bird.

The variability in behavior referred to above will appear in a number of concrete cases which follow. At ten minutes after five o'clock on the afternoon of June 13 an Eagle was seen coming at great speed from the lake, and bearing an object held low in both talons; a little Kingbird was in pursuit, and like a pestering wasp now and again darted at his head, but it could not stand the pace and soon dropped behind; on reaching the nest the Eagle slowed down, hesitated, and then passed into the grove where for a minute or two it circled over the tree-tops; returning it entered the eyrie from the west side and landed a good-sized fish; after taking a number of steps it stood stock still and for some minutes its keen eyes surveyed the situation on all sides; it then cautiously moved to the margin of the nest, and dropping off rose to take a stand on one of the perches. It was clear enough that we were then dealing with a very suspicious bird whose behavior was anything but free. This did not, however, affect the excited Eaglets, both of which were crouched and squealing when the parent appeared; at the first opportunity one of them snatched the fish, and spreading over it, with feathers erect and head extended downward until its bill was nearly in contact with the food, continued for some time to squeal, thus claiming the quarry as its own and warning off its nest-mate; but as commonly happened there was no interference, and for a quarter of an hour Eaglet number one stood with both feet planted on the fish and continued to feed; sinking its bill in the white flesh, with upward jerks it released small sections which were swallowed with avidity; meantime, the second

Eaglet, with head extended, was standing near keenly watching every move and patiently awaiting its turn. This behavior-formulary of the hungry Eaglet in the presence of food is thoroughly characteristic, as it is of young Hawks at a similar stage of development; but this does not mean that it is invariable for, as will be later seen, there are degrees of hunger when the patience of the waiting bird gives out. An occasional variant from the standard reactions just described was to raise the wings above the back instead of dropping them (See Pl. XXVI.), and this response to the parent with food was not concerned with their maintenance of balance, nor occasioned by the presence of the other Eaglet, for it might occur on either nest or perch and when there was but one bird in the eyrie.

At this time we had not learned to distinguish with certainty the sex of the visiting bird, but from subsequent events we were assured that the visit just recorded was by the male, and that it was the female which, towards six o'clock, came to the eyrie with a brown chicken, partly plucked, dangling from its talons. The moment it touched the eyrie, the Eaglet which had had second chance at the fish began spreading and squealing in regulation style, seized it and was soon busily engaged in stripping off the breast meat and working at the drumsticks. Upon landing, the old bird came immediately to attention, and turning her head quickly from side to side sent a stern glance at our tent and now at her young and the food. Presently she walked up to the carcass of a fish which an Eaglet had appropriated, and planting a foot on it began to help herself. The Eaglet we designated as "number one" now lay down beside the mother to rest and await his turn. Having derived little satisfaction from the remains of the fish the old Eagle advanced towards the young one engaged with the chicken, but only to receive the characteristic warning,—squealing, and spreading with erected feathers; for a moment she hesitated, then without forcing matters found an outlet for her emotion by seizing a stick in her bill and dragging it about the eyrie; such an act, which is quite incongruous with any end to be attained is often seen in the young, when it may be interpreted as 'play,' using this term in a rather broad sense. After spending eighteen and a half minutes at the nest the mother bird suddenly moved

up to the front, dropped off and, with the momentum gained by the descent of a few feet, gracefully rose and made for a tall tree-perch in the woods.

Upon entering the grove on the morning of June 14, 1922, we recorded what proved to be an unusual event, a visit of an old bird to its eyrie "empty-footed," a circumstance referred to in section IV; at that early hour both birds were perched close together on one of their favorite stands, but facing in opposite directions. When we had advanced to within two hundred feet of them they went off in succession and in the following order, the male to the north and the female to the south; but the latter soon wheeled and landed on the eyrie, apparently for its inspection, and there she remained several minutes as we were coming up. The same thing apparently happened as we were approaching the woods on the morning of June 16, when one of the Eagles entered the nest from the south side and remained eighteen minutes. This was without doubt the female also, and we thought that in this instance she might have gone to the eyrie to feed; but, however that may have been, we soon disturbed her mate on the perch where, as we were convinced, but a short time before she had been resting beside him. When we entered the tent the young were standing together bolt upright, facing the breeze, and showed from their quiescent behavior that the larder had not been recently replenished. Although two other visits were recorded in which nothing was observed in the talons of the parent we were not positive that some food, actually delivered, might not have eluded us.

Shortly after eleven o'clock on the morning of June 14 the female Eagle was seen coming at full speed direct from the lake, and bearing in her talons what proved to be a large blue pike. Landing on the right side she dropped the fish and came to attention as usual; and while the young were crouched and squealing she grabbed the prey in one talon and dragged it to the center of the nest; then with both feet implanted in the fish she began feeding with great voracity while the Eaglets stood by in suspense; after a time she began to tear off chunks of the white flesh and to pass them up, one at a time, to the nearest bird, which received three pieces in quick succession, from bill to bill; then the Eaglet on her left came in for five helpings, served directly, as before;

after this she finished her own repast, ever and anon darting a swift glance around or turning an eye to the sky overhead. Finally the monarch bird stood erect and for full five minutes calmly surveyed her nest and young and the scene spread out on all sides to her view. Suddenly she jumped off, spreading her white fan of a tail, and an instant later drawing up and folding her talons; in another moment she was preening on the tall east perch.

An Eagle, assuredly the female, came to the eyrie at about six o'clock on the morning of June 16, holding in her talons neither fish nor fowl but fresh twigs of the pin oak and, dropping them as she landed, promptly took to the stub-perch. Meantime the young Eagles pecked curiously at the green leaves and for many hours thereafter were seen to occasionally approach them and toss them about as in play; and there they remained only to finally wither and be trampled under foot. The possible meaning of so curious an act will be considered a little later. After resting twenty minutes the Eagle left the nest-perch and went direct to the lake, flying low and going far from shore. In six minutes she was back with another blue pike and in a minute after landing it she jumped up to the stub; twenty minutes were then passed in preening, guarding and quiet repose; returning to the nest, she seized the fish on which one of the Eaglets was working, tore it apart and ate of it with gusto, now and again handing up pieces to her young. Ten minutes were consumed in the feeding processes, when she went to the stub for the third time and in five minutes joined her mate on the tall east perch. Twenty minutes later (7:45 A. M.) this same bird was off again for the lake, flying low as before; again she returned in exactly six minutes, and this time with a small catfish; tarrying but six minutes at the eyrie, she dropped off and flew to the east. After the lapse of a quarter of an hour the spirit moved the male, who first reconnoitered the nest, wheeled about and flying low down trailed eastward in the wake of his mate. On another occasion, if our identification of the sex was correct, the female Eagle, five minutes after the delivery of a fish, flew directly from the nest-perch to the lake and in three minutes was back with another, thus making record time.

Much to our surprise, from June 14, 1922, until the close of nest-life on July 4 of that year, all direct feeding of the Eaglets

ceased. With one exception the time spent at the nest was reduced to a few minutes or seconds, the birds coming at great speed, dropping their quarry and making off at once for a favorite tree, no nest-perch being available at that time. Equally surprising also was the fact that in 1923 bill-to-bill feeding went on up to the last day of eyrie-life, or for weeks after the young Eagles could help themselves and when they had attained a size scarcely inferior to that of their parents.

This direct feeding of the young of a precocious bird, especially when at an advanced stage of growth, would be more remarkable did we not know from experience what variation in food habits may occur not only between closely related individuals, but even in the same individual at different times and under diverse conditions. What the regular aquiline practice may be during the period of down, I cannot now say, but at this late phase the common habit of the old birds, when hungry and unafraid, was to tear open the prey and first satisfy their own desires; then, by way of introducing it to their young, help them directly to a few tastes. As already noticed, there was seldom any contest or rivalry among the Eaglets, seldom any eager crowding around the parent, but each commonly awaited its turn, and often at a respectful distance. However, exceptions to this and certain other rules the reader will notice as the narrative proceeds. The pieces of food were held up to the bill of the Eaglet (See Pl. XXIII.), never placed in an open mouth, much as at a very early stage I have seen food-morsels passed to the bill of a nestling Gull; quite as often as not the bills of both birds were depressed to such an extent that a clear view and photograph of the act were difficult to secure. Such a proffering of food, it would seem, represents an instinct which, as in so many other cases, long outlasts its need and primary use. The direct feeding observed was mainly by the female, and only rarely did the male possess sufficient confidence to partake of food at the nest and serve his young.

Macpherson's observations of the feeding-habits of the Golden Eagle began when the young were about 18 days old, when they received morsels of flesh and often titbits, such as pieces of liver, directly, as in the American Eagle, but at that stage they were not allowed to devour the intestines, a delicacy which the old birds claimed as their own. The male was never seen to feed at the

nest, probably as a result of his greater wariness or timidity, and seldom did he venture to offer food to the young. Leverets were brought whole to the eyrie, but the hind quarters only of fully grown rabbits and hares, and at first plucked but not skinned. The older animals presumably had been divided and their fore-quarters devoured at some convenient spot near the eyrie. At the age of twenty-three days the Eaglet was encouraged to feed on his own account, and was presented with a grouse which had been previously plucked, disembowelled and torn into fragments by one of the parent birds. When six weeks old he was fairly well able to help himself, though he seemed unable or disinclined to stand on the prey and use his bill-hook with much effect. At this time less care was shown on the part of the old birds in plucking and serving rabbits, and the Eaglet, on attaining his eighth week, was seen to devour a whole rabbit "at one sitting," head and bones included.

The writer just quoted said nothing about established habits of approaching the nest which was placed high on a ledge of rock. The circumference of the Vermilion nest is divided by four upright branches into four well marked sectors, that on the southwesterly side, towards our observatory, being the largest and embracing nearly one hundred and eighty degrees. During the first season we kept a record of the sectors which the Eagles used for entrance and exit at each visit, fully expecting that a definite habit of entering and leaving the eyrie would be formed by individual birds, at least when their behavior was reasonably free: but nothing of the sort occurred, and only once in the course of 60 consecutive visits were their entrances and exits similar on two successive occasions. When coming from the east and flying at excessive speed, they might as often as not enter the eyrie on the west; rarely, when flying high, would they approach from either front or rear, pause for an instant over the nest and drop like a plummet to its center. Quite often during our first season they would come direct from the lake, drop low over the intervening fields and then rising suddenly as they reached the nest slip over the far side with such speed that it was often difficult to see what was brought. Such behavior, dictated no doubt by fear or suspicion, bid fair at times to become a regular habit, but the choice of sectors was seldom the same.

The following incidents which occurred in 1923, and for the first time gave us the whole Eagle family "at dinner," we owed to the adoption of the nest-perch: June 19, 10:49 A. M.: the male reconnoitered the nest, passing on the north side and was soon soaring and circling over the farm-lands to the northeast. A minute later the female landed a large fish on the eyrie and promptly took the stub, but after a brief rest was on the nest again; looking about cautiously and taking one step at a time, she advanced towards a feeding Eaglet and when he had given place began to rip up the fish and satisfy her own hunger; pausing from time to time she would hand out pieces to the young who had gathered about her; with heads well down and almost in contact with the nest they received them directly from her bill. Suddenly at 10:53 A. M., with a shrill scream, as if to announce his arrival, the male plumped down with a fish; for a moment he stood beside his feeding mate and the four Eagles together made a very striking and unusual picture; his stay, however, was brief, and upon his departure the female returned again to the nest-perch and settled down. About half an hour later, when she was still on the stub, the male again came screaming to the eyrie and with another fish, this time entering on the west; but something had evidently displeased him, for walking across the nest he gave out a number of emphatic yelps, and after a minute went off from the easterly sector. On this occasion the female held to the nest-perch for an hour, finally leaving it shortly before noon. (Compare Pl. XXI.)

When they were coming direct from the lake-shore we would often see the Eagles rise to clear the wires by the railroad, then drop to within fifty feet of the ground to rise perhaps fifty feet higher as the nest was approached, and putting on the brakes at the moment of alighting enter at a rather high rate of speed. More than once we have been warned of their presence by the wiry, squealing cries of the Eaglets who rarely failed to sense the oncoming parent from afar; or, when our attention was directed away for the moment, and the sated young failed to give the usual signal, it would be recalled by a loud thud which was sometimes made by the impact of the bird's body with the nest itself. The position of the Eagle's head when alighting, whether erect or depressed, and of the wings, whether raised over the back or directed forward, seemed to depend on the speed of the bird at

the moment of slowing down. Only once did we see the Eagle, upon leaving the eyrie, move to its edge and, expanding its wings to their full extent, rise almost directly without the usual preliminary step of dropping down several feet before ascending to the perch. We have a photograph of a bird in this unusual pose, on the nest, but unfortunately made with a long-focus lens which failed to stop the motion completely.

Whether the frequent act of devouring some of the food at the nest on the part of the old birds was invariably dictated by hunger, or more commonly incidental to an instinct, stronger doubtless at an earlier stage, to tear open the prey and prepare it for easier mastery by the young, we cannot say; we are inclined, however, to regard the eyrie as not only a rendezvous but as a sort of common dining table for the whole family. The fish and fowl were often partly disembowelled and an Eagle was once seen to carefully remove the gills of a fish before beginning to strip off the flesh.

Although we constantly watched the young Eagles, day in and day out for many weeks at their eyrie, and the old ones when both on it and their perches, we never saw them in the act of regurgitating the indigestible residue of their food from the stomach and we found but few castings of the adult Eagles intact; one of these had been freshly disgorged from a perch on the observatory tree, which the old birds had the habit of using when refitting their nest in March, 1924. It was a sodden cream-colored mass of the remains of feathers of the domestic fowl and measured an inch to an inch and a quarter in diameter; another, about which some doubt might be expressed, was found neither under any of the habitual perches nor on the nest but on the platform of our observatory, beneath the rail, to which the Eagles had been seen to resort after the novelty of the structure had worn away. This was a brown, flattened mass of hair, leaves and other organic substances, and measured about one and one-half inches in diameter; it might pass equally well, perhaps, for a pellet of an Owl but for one or two tell-tale objects,—the elytra of a beetle and an entire grain of corn, which inevitably suggest the digestive stomach or proventriculus of the fowl.

Western Reserve University,
Cleveland, Ohio.

(*To be concluded*)

AN ARIZONA VALLEY BOTTOM.

BY FLORENCE MERRIAM BAILEY.

IT was only about a thousand feet lower than our camp in the mesquites and live oaks at the foot of the Santa Ritas and it did not take our good neighbor's Ford long to rattle down the nine miles over the stony desert slope past the mistletoe-hung mesquites and catsclaws of the twenty-three acres where white labels marked my series of Cactus Wren and Verdin nests and we startled ground squirrels and jack rabbits—the handsome white-sided *alleni*—swerving around sharp turns made to avoid washes from mountain canyons, crossing the terrace where the grotesquely jointed bristling cholla cactus afforded nesting sites for numerous colonies of Cactus Wrens and woodrats and a Cactus Woodpecker's nest had been discovered; down at last to the sight that always brought a thrill, the first of the spectacular giant cactus trees raising their long bare arms stiffly straight toward the sky, their riddling Woodpecker holes suggesting questions as to the home sites of the Gila and the Gilded Flicker which we craned our necks to watch fleeing from them as we sped by. And so at last we halted at the gate placarded "Mountain Road" which, shut carefully behind us, let us into Continental, the bungalow hamlet of the Rubber Company on the edge of the Santa Cruz Valley.

It was a drop of only a thousand feet but took us from the atmosphere of the cool mountains to that of the warm valley bottoms. The difference struck us forcibly one morning in late February when after two days of cloud and drizzle in the mountains resulting in a much-rejoiced-over fourteen one-hundredths of an inch of rain, we left the dark wintry mountains behind to look down on light, summery, shadow-streaked desert ranges and descend into the valley sunshine. Another morning when the sky over the valley was gray and parallel lines of rain slanted down toward the desert ranges, they mostly stopped, cut off in a jagged line at the bottom by the blotter-like dry air which, in characteristic Arizona manner, absorbed the moisture before it fell. And even then, although

most of the short ranges of the panorama outspread below us were in shadow, sun shafts illuminated occasional crater-like peaks.

The fact that rubber and Egyptian cotton were being raised, albeit experimentally at 2900 feet altitude in the Lower Sonoran zone, showed our southern latitude. The wild native cotton bush, however, grows in the zone above along the lower canyons. On a tent top overlooking the rubber plantation a Palmer's Thrasher seemed to have established his singing post, shouting out loudly enough for all the workers of the village to hear, both the Mexicans setting out young rubber plants in the experimental garden and those putting the three-year-old bushes, which looked much like gray sagebrush, into the crusher, roots, trunks, leafy branches and all, to extract the rubber.

Just below Continental with its bungalow hamlet and adjoining adobe Mexican village, across the tracks of the Tucson-to-Nogales spur of the Southern Pacific, we drove down into the fertile bottoms of the Santa Cruz River which were teeming with animal life—that of both bird and beast. While the wide river bed was dry except for an occasional narrow wet streak, large greening cottonwoods spacing one bank and dense thickets, logs, and flood trash along the other showed that at times the river lived up to its traditions.

In its confused mass of flood trash numerous wood rat houses—large piles of sticks, leaves, and rubbish—were found, and both the thickets and the sandy river bottoms were so tracked by small mammals that the Mammalogist after eagerly naming the footprints got excited, declaring that it was one of the most richly populated mammal grounds that he had seen in all his forty years of field experience. Not that there was such a great variety of species, but such a superabundance of individuals. The thickly tracked bottoms must have presented an animated scene under the full moon, we thought. The most abundant of all the small mammals proved to be the typical desert kangaroo rats, one species of which, barely found at the altitude of camp, was the commonest of all. Two other mammals not found above were the destructive cotton rat of the southern cotton fields and the little round-tailed ground squirrel, here found significantly living in a dyke protecting one of the fields of the Rubber Company. One species of the handsome kangaroo rat we were sorry to see was also making holes in

the dyke. A small side gulch was found especially good trapping ground for the still smaller mammals and visiting the live traps set in niches in its walls of a morning had the interest of visiting the cages of an unfamiliar zoo.

By day the sunny bottoms were full of bird life, and in March and April, ringing with bird songs. A small covey of Gambel's Quail were occasionally flushed or heard talking as they trotted along and once four ran ahead of the Ford so long that it was suggested they had not time to fly. On different days the Canyon Towhees were heard singing, and both the Say's and the Black Phoebes calling in their gentle tones, while a few Audubon Warblers jerked out their flat chip, the House Finch interlarded his matter-of-fact call note, Woodpeckers drummed, and a Roadrunner snapped his bill. A Shrike caught the eye, and Vesper Sparrows were seen picking about on ground which they matched, Mourning Doves rose from the sand with whistling wings, Horned Larks passed overhead, a few gray-backed Swallows flew up and down the river bed, flocks of Gambel's and other smaller Sparrows rose ahead of us, while close bands of white-winged, Lark Buntings, in ever larger and larger flocks, gradually assuming the black plumage as the spring waxed, passed up the bottoms with the rich musical *whee-u* which fell gratefully on the ear, as of distinguished passers-by.

The cheery round of House Finches, the rollicking, jubilant song of Thrashers, the rich elaborate song of Meadowlarks, and the soft cooing of Mourning Doves recalled delightful days in the orange grove country of southern California. But two striking birds unknown in the fog belt of California gave a distinct Arizona flavor to the assemblage—the Vermilion Flycatcher and the White-necked Raven.

When I was watching a pair of Gilded Flickers one day, a flash of red on a bush near the ground excitingly proved to be from the red cap and brilliant undersurface of a Vermilion Flycatcher. He went about flycatching casually while I was feasting my eyes on his splendid color. When his back was turned I was struck by its plain brownness which is such a contrast to the scarlet of crown and breast that an enemy might well be put off the track, for who could imagine that the puffed out red ball of the crown had any connection with the flat brown back? Surely this is

'secant coloration' raised to the nth power—a patch of flame-color cut off from the figure of the bird by flat brown which, in this case, toned in admirably with the brown of the brushy river bottoms. Seen against the sky the red went out surprisingly. One of the beauties gave us a rare treat as we drove down by the river, one morning, actually flying along with his lilting Flycatcher flight just ahead of us down a row of young cottonwoods. When at last he lit it was in the sun in full view on an old stack of bean straw, where his flame color evoked a discussion of the meaning of his name Pyro-cephalus and the facetious remark—"Better look out or he'll set the straw on fire."

The other bird not found along the coast of California was that characteristic bird of the desert, the White-necked Raven. One seen on top of a yucca was a pleasant reminder of the desert country of New Mexico. A number were sometimes seen in an old corn field where there was a trickle of irrigation water and once a flock of about twenty-five was found in a freshly plowed field belonging to the Rubber Company, some of them following the plow. Another time a flock of seventy-nine of the large black birds was counted drifting slowly low over the fields. While making up their minds which way to go on their foraging expeditions flocks of different sizes would circle around over the dry river bottoms, their black backs whitening as they circled under the sun. Curiously enough they seemed unwilling to tolerate the presence of a bird of another species, once chasing off a Red-tailed Hawk that joined the flock as if there were not room in the sky. One flock of thirty or forty talked softly with a continuous croaking *kackack-hackack* as they rose higher and higher, perhaps to six or seven hundred feet; then gradually drifted off until only ten were left overhead. Another time a hundred and twenty were seen milling in the sky. Sometimes one would close its wings tight to its body and slide down through the air. Early in March the Ravens were noticed occasionally flying in twos but as they appear to be rather late breeders it may have been without significance. The larger Ravens are supposed by some observers to remain mated through life and that might be the case with the White-necks, though it seems unlikely with gregarious birds. Some day, perhaps, such speculative questions may be settled by bird banding.

On the ninth of March when the owner of the Ford, after leaving us at our trapping ground, went on thirty miles farther to Tucson for supplies to take back up the mountains, we spent a long red letter day in the beautiful sunny valley. It began most auspiciously for in the live traps we found two of the valley mammals needed most, the cotton rat, and the round-tailed squirrel that completed our number of ground squirrels for the locality, as we already had the pretty little singing one and the gray-tailed whistler, the antelope squirrel, at camp. Near the dyke where the mammals were taken, an orange-eyed Bendire's Thrasher was seen and nearby a Gnatcatcher was noted in a young cottonwood; then a Desert Sparrow's song was heard, two Say's Phoebes were caught chasing each other and twittering, and two Doves flew off together apart from the flock.

As usual the pleasant valley bottom was full of birds singing their joyous songs in the morning sunshine. A flock of the White-necked Ravens whose evolutions it was always interesting to watch —perhaps seventy-five of them—came flying up over an old corn field, breaking before they reached me, about fifty turning to the right and milling over the brushy bottom land, the rest turning to the left and milling over a bare field. Soon the first band that had broken away as if dissatisfied with the brushy ground beneath, divided again, about twenty-five breaking away to mill over the plowed field. Before long the large flock had entirely disappeared from sight and sound, and only an occasional wanderer was seen during the rest of the morning.

When the traps were all emptied of their catch and those for diurnal mammals reset for the day, cool morning had changed to hot noon and after making our way through a thicket where the beautiful soft feathers of a Great-Horned Owl told of some wanton act, we crossed the sandy river bed where the odd Roadrunner's track—two toes pointing forward, two back—was found together with a variety of small mammal tracks, and then climbed up the high bank to enjoy the shade of a big green-topped cottonwood in which a pair of Red-tailed Hawks had their nest. Soft tapping overhead drew our attention to a female Cactus Woodpecker with its white and black barred back and a call which suggested that of the Downy.

An old Woodpecker's hole just out of reach was discovered in a stub under the edge of the cottonwood and the Mammalogist proceeded to investigate it. Standing a forked branch against the stub for ladder with a stout stick in the upright fork to prevent his boot from wedging, he climbed up and with a weed stem gently poked down inside the hole, until he recognized the soft touch of feathers. A moment later a long feathered leg was thrust up to drive off the enemy and sharp talons clasped the intruding fingers. So tight was the clasp that when pulled up the long feathered leg was followed out of the hole by its owner, a little, eared Screech Owl. Wanting to examine the hole the Mammalogist handed the handsome little bird to me. While I was admiring the clear black and gray pattern of its soft feathers I inadvertently let its legs slip, whereupon its sharp claws seized my finger, drawing tighter and tighter. "Straighten its leg," I was admonished with the explanation, "when its leg is bent the tendon over its heel draws its claws tight and it can't open them itself; straighten its leg and the claws open." It seemed quite a worthy experiment to try at the moment and I was soon celebrating my release. The old nest hole was a deep one but by reaching down to the elbow a number of ejected Owl pellets were discovered, together with small mammal bones from disintegrated pellets, among them those of the wood rat, two genera of kangaroo rats, two species of white-footed mice, a grasshopper mouse, and a pocket mouse. Cactus seed found with the bones had probably been brought in the pouches of kangaroo rats which were most abundant in the bone remains. Numerous feathers were also found in the bottom of the nest, mostly gray, probably Quail, but some were of the dull red of the female Arizona Cardinal.

While the nest was being examined a tiny lizard, a good match in color for the gray bark of the cottonwood fairly flew from the stump. When the nest had been examined carefully the little Owl was returned to finish its nap. Near the stub, under the cottonwood a small 'killem' trap that had been missed from the trap line was found containing the hind foot of a nocturnal white-footed mouse, a pretty bit of circumstantial evidence to convict some one, but the Owl was not the only nocturnal prowler in the neighborhood.

In the shade of the cottonwood we ate our lunch, making a leaf-

and-stick fire no larger than the crown of a hat, cutting slender twigs for skewers and using a section of branch to rest them on, so toasting our bacon and cheese over the miniature fire in approved camp style and enjoying our feast as all else on this red letter day with its break in the routine of formal camp life.

Hearing a plaintive note we looked over at the next green cottonwood on the river bank and on a low branch discovered one of our rarely seen Black Phoebes, flying out and back for insects. Another was seen by the overflow of an irrigation ditch while still others were found perching on a wire fence and on old cornstalks, both of which served as good lookouts, taken advantage of also by Say's Phoebe whom we were especially glad to see again. As we looked off over the river bed, two Rough-winged Swallows flew up and down the river channel with its hole-punctured banks, out over the brushy bottoms and over the old corn fields, as they went giving their characteristic *trip, trip.*

A green tree top close by was alive with House Finches, chattering merrily as they cut off and ate the ripe seeds of the cottonwood. *Car-po-dacus*—fruit cutters, in very truth. Through the field glass we could see the long green racemes with their seed pods suggesting the stems of choke-cherries. As the seed pods were cut and the seeds eaten, their tiny cotton balloons came sailing lightly down through the air.

In this same place six weeks later when we had again climbed the bank to lunch in the shade of the big cottonwood, a brown, round-headed Short-eared Owl flew from the tree and passed up the line of cottonwoods. All the morning I had been hearing a chorus of Red-winged Blackbirds from that side of the river and as the Owl flew the black flock swung out from one of the trees. It settled back, however, and after lunch I sauntered along toward the tree to hear the concert. One of the birds was standing on a branch in plain sight, opening his bill wide and singing with all the swing and abandon of the war-time leader of a 'community sing.' How he did enjoy it! While I was standing spellbound, to my chagrin he caught sight of me and down swung the whole flock, making off to the mesquites. I followed slowly and cautiously and by the time that I began to distinguish black forms inside the green screen the rich rollicking chorus was in full swing again.

Another day, two of the rare Gilded Flickers which come over the Mexican border into Arizona and nest largely in giant cactus, though also in cottonwoods, were found together in a cottonwood on the river bank. Presently one flew across the river bed to a hole conspicuously black with shadow about twice the size of the ordinary Flicker hole in the opposite river bank. On reaching it the explorer—for a nest site or only for ants—called *clape*—open to the interpretation of *Come on over*—and disappeared in the shadow. Its companion did not appear interested, however; perhaps, if it were a nesting site that was being suggested, knowing that it was quite too early to be thinking about such matters, and after a little, with the characteristic Flicker *if-if-if-if-if-if-if* flew off down the river. Near here a Sage Thrasher, an old acquaintance of the sagebrush deserts, was seen in the bottoms, running rapidly over the sands in a constrained conscious pose with head drawn back as if from a tight check-rein.

On our first visit to the cottonwood, the old Red-tailed Hawk disturbed on her big stick nest in the top of the tree flew up and with her mate circled around high above us. Once she came swooping down to a branch close to the nest over our heads, when the sun falling on her made parts of her figure glisten. As we ate our lunch we watched the fuzzy gray nestlings whose eyes looked like black shoe buttons move around in the nest and stand up on opposite sides screeching shrilly for their parents to come and feed them.

Not far up the bank an irrigated strip of bright green wheat attracted the Meadowlarks who gave their rolling chattering call, singing and answering each other from the green in clear sublimated tones in notes which to hungry eyes suggested, *Green grass looks good' in Ari-zo'-na.*

It was a peaceful landscape with green cottonwoods spacing the river bank, Mexicans plowing the fields beyond, and softly tinted desert mountains showing in the background. Bird songs filled the air and a gratefully fresh breeze reached us as we rested under the shade of the cottonwood. Watching the two Red-tails and a Raven soaring and sailing in the sky the Mammalogist commented with satisfaction: "The Raven tries to get higher than they are, but he can't do it." Looking overhead at the shining green cottonwood—alamo—leaves touched by the sun recalled the

delightful line, redolent with the *dolce far niente* spirit of the southwest—". . . . beneath the alamo to lie and watch the clouds go floating by," when, as if to suit the line, an exquisite bit of rainbow was discovered in the floating clouds.

Making our way back over the dry river channel we crossed beautiful smooth sand dunes, ripple-marked by the wind, and climbed up a cut bank gulch where there was a productive line of small traps to be examined, returning to the road by way of the Pyrocephalus bean straw stack, where a poor old Mexican was sorting and sifting the beans, his gray burro, with saddle off, standing under the mesquites nearby. A gray Bendire's Thrasher coming into view at the moment evoked the comment that both Thrasher and burro were camouflaged for the desert, so nearly did they approximate the color of the branches surrounding them that one did well not to miss them altogether. The sight of the old Mexican trying to save the last few beans from an abandoned stack was a pitiful commentary on the hard times in this year of drought in the valley—again we had cause to be thankful for better conditions in the mountains—and another day it was brought home to us still more strikingly when two Mexican bean savers came from the village and a party of Mexicans, two men driving a mule, one boy on a burro, and one on foot crossed the river bed—as they came sending a flock of fifteen Meadowlarks flying over the channel—all on their way to this same abandoned stack. Later when we passed them they were working soberly, holding up handfulls of beans to let the wind blow off the chaff.

During the afternoon of our long day in the valley we were much interested to find that the large flock of Ravens which in the morning had milled around overhead and then dispersed returned to the river bottoms before night, perhaps to roost in the cottonwoods.

Before leaving the valley we revisited the dyke where the traps had to be reset for the night, and while waiting I took a last look around for birds. What a contrast the valley bottom offered to the base of the mountains, even though only a thousand feet below! At camp only one Mourning Dove and one Black Phoebe, both lonely wanderers, had been seen during the winter; here they were at home, and the gentle note of the Phoebe, the soft cooing of the Doves and the musical whistle of their wings blended charmingly with the summery chorus. At camp House Finches

had been seen mainly in the tree tops in passing, when a preoccupied call note was the most vouchsafed; here their merry chatter and their gay, sweet songs seemed part of the valley sunshine. The Short-eared Owl at camp was replaced by the Great-Horned and the Spotted; Gilded Flickers had been rarely seen higher than the giant cactus, just above the valley; Redwings which would find nothing to attract them on the arid stock range above, sang their joyful choruses in the rich irrigated bottoms; while the hordes of White-necked Ravens milled over the cultivated rubber fields where, at will, they could descend to follow the plow; and the gathering flocks of Lark Buntings found food for even their increasing multitudes on their journey north.

Looking back at the mountains—a resource that never failed in satisfaction—it was easy to dream of the birds entirely foreign to the valley found on their heights. Elephant Head, the sheer rock cliff at the base of the range in the foreground suggested White-throated Swifts, for there they were supposed to find congenial homes; Madera Canyon, the wide canyon trough darkly wooded with live oak and pine leading up to the pass between Baldy and Hopkins, an old rich collecting ground, boasted names to conjure with, such as Mearns' Quail, Coppery-tailed Trogon, Arizona Woodpecker, Stephens' Whippoorwill, Broad-billed Hummingbird, the Sulphur-bellied, Olivaceous, and Coues' Flycatchers, Painted and Red-faced Warblers, and Mexican Creeper, with many another to add distinction to a desert range. On the highest ridge of the mountains a patch of yellow pine timber which, when seen from the hot cactus desert flat rested the eye, suggested Crested Jays and small Sonoran deer enjoying the cool rich shadows.

It was good, too, to think of the Forest Service outlook on top of the highest peak, where faithful fire watch was kept, no matter how fierce winds and storms made it their plaything. Indeed, perhaps the best gift of the sunny valley bottom was its view of the mountains, the beautiful Santa Ritas, enveloped in blue atmosphere; for from the valley we looked up the wide canyon trough to the two crowning peaks of the range, Baldy, the highest, with head upreared majestically, facing Hopkins across the gap; a narrow band of white cloud above the peaks often adding to their height and nobility.

1834 Kalorama Road, Washington, D. C.

THE POLYNESIAN FRUIT PIGEON, *GLOBICERA PACIFICA*, ITS FOOD AND DIGESTIVE APPARATUS.

BY CASEY A. WOOD.

IT was probably John Murray (*Proceedings of the Zool. Soc.*, p. 737, 1877) who first drew attention to the unusual anatomical construction of the gizzard of *Carpophaga* [*Globicera*], as shown in two specimens of *C. latrans* taken on Kandavu, Fiji, during the voyage of the 'Challenger.' His notes on this subject are, in part, as follows:—"Stomach contained the fruit of some tree unknown to me. The coat of the stomach had hard papilla-like ossifications of a circular form arranged in two or three rows." The material was submitted to A. H. Garrod, Prosector to the London Zoological Society, whose report (*Proc. Zool. Soc.*, 1878, p. 738) furnishes interesting reading. Of the digestive apparatus he remarks that the thin-walled and capacious crop contained only one object, a complete fruit, subsequently identified as that of *Onocarpus vitiensis*, one of the *Anacardiaciae*. Parenthetically this tree, as described by Seeman (*Flora Vitiensis*, p. 176), is 60 feet high, with large, oblong leaves and a curious fruit, somewhat resembling the seed of a walnut. Garrod pointed out that for the attrition and crushing of this hard and compact nut and its capsule a modification of the gizzard-walls of this Fruit Pigeon has been necessary, although the organ itself is not developed to anything like the extent one notices in *Gallinae* or *Anseres*, but is small, and has its muscular walls comparatively thin. For effective grinding of the ingested food the bird depends upon quite another agency, as set forth by Garrod in describing the stomach mucosa:—"Instead of being smooth, or plicated, as is usually the case, its surface is raised into horny cones which closely resemble in appearance the tubercules for the attachment of the spines of the echinoderm *Cidaris*." He further describes these conical processes as horny, erect and transparent when sectioned. The diameter of the larger (and more numerous) averaged 7 mm. at the base; their height was about 4 mm. The smallest cone was as high as the largest (and

consequently more pointed), its basal diameter being only 4 mm. The cones were arranged on the muscle-masses in regular fashion, and were close to one another. Of the 23 found in each specimen, 18 were disposed in rows of three, whether counted longitudinally or transversely. The remaining five were placed "on the tendinous, intermuscular walls of the organ in longitudinal rows, two in one row, three in the other." The illustrations supplied by Garrod show that the cones do not contain osseous tissue but are corneous throughout, and of the density of ox-horn. "The attached surface of the epithelium does not participate in the undulations of the free surface, being quite smooth."

The mucous lining does not send any processes into the cones proper; between the latter it is yielding and, says the report, is only semicorneous. The article quotes a description of a somewhat similar condition found by Verreaux and Des Murs (*Revue et Magasin de Zoologie*, p. 168, 1862) in the gizzard of *Phoenorhina goliath*, but in that bird the cones are larger than in *C. latrans*. They were also ossified and obliquely placed, the remains of the vessels of ossification appearing as a central fibrous peduncle in each cone.

A remark of the writer in the 'Challenger' report is indirectly responsible for this short paper:—"I am informed that *Carpophaga* [*Globicera*] *pacifica* in the Samoan Islands feeds on nutmegs, from which it is highly probable that in the species the gizzard-epithelium is modified in a manner similar to that of the Fiji or New Caledonian species. Specimens of *C. pacifica* would therefore be of special interest for the determination of this point." During a residence of several months (May–November, 1923) in the former Group, with excellent opportunities to study Fijian bird life, the present writer dissected twenty-one specimens of *Globicera pacifica*, mostly from Viti Levu, and found the intestinal tract much the same as that partially described by Garrod in *C. latrans*.

The stomach and duodenum held, in the majority of instances, partially digested food; in four, both oesophagus and gizzard were empty. In two cases the gizzard and lower intestine were empty, while the crop held one or two unchanged fruits. In 16 instances the stomach or other part of the digestive tract contained one variety of the wild nutmeg. Indeed where nutmegs were obtain-

able this Fruit Pigeon appeared to live on them exclusively; it seemed that other fruits were swallowed only when there were no nutmeg-bearing trees in the neighborhood. As a rule the gizzard contained a single fruit; in a few instances there were two, and in one specimen the stomach held two large nutmegs while the oesophagus was distended by two others. It is readily seen that the local English name—Nutmeg Pigeon—given this bird is entirely justified.

The following field notes of nine *post mortem* examinations will serve further to emphasize the character of the food ingested by this species:—

July 18, 1923. In the gizzards of eight specimens of *Globicera pacifica* there were 13 wild nutmegs (*Myristica castanaefolia*) and a drupe that resembled the fruit of a small cherry. Two stomachs were empty, one held a single nutmeg with no traces of the pericarp; five held two nutmegs, one quite large; another had two of the largest nutmegs as well as a second drupe of the species aforementioned and unknown to me. In two stomachs there was a "matting" composed apparently of the undigested pericarp lying between two small-sized nutmegs.

August 12, 1923. Took from the gizzard of a Nutmeg Pigeon at Vunisea, Kandavu, a large quantity of softened and disintegrated mace, and with this inspissated arillus a wild nutmeg 32 mm. long and 29 mm. wide.

No gravel or sand was found in any of these gigeria. In two instances a gritty substance was felt between the thumb and fingers, but the ingestion of small quantities of earth may easily be explained by the fact that these pigeons occasionally pick their food from the ground.

There are at least four species of the genus *Myristica* growing wild in Fiji, all of which furnish food to the "Soqi" or Nutmeg Pigeon. The commonest of these is *M. castanaefolia*, found in all the larger islands as a handsome tree 60–80 feet high. The mature fruit is as large as a full-sized butternut which it resembles, both as to testa and pericarp. Some writers assert that settlers in Fiji use the kernel of one species as a substitute for the nutmeg of commerce—*M. moschata*. It has the shape and size of the latter, and the color of the aril or "mace" is similar, but its aromatic properties

are not well developed. The present writer investigated this matter and found that the wild Fijian nutmeg, exhibiting as it does only a suspicion of the characteristic, spicy odor and taste, is rarely used as a condiment either by Europeans, Indians or aboriginals. Moreover, several attempts to export the most promising of the species failed as a business speculation. *Globicera* has also a liking for the small fruit of the Banyan Fig (*Ficus bengalensis*) of which it eats sparingly and when nutmegs are not available. The writer has found the remains of these in the gizzard of three specimens.

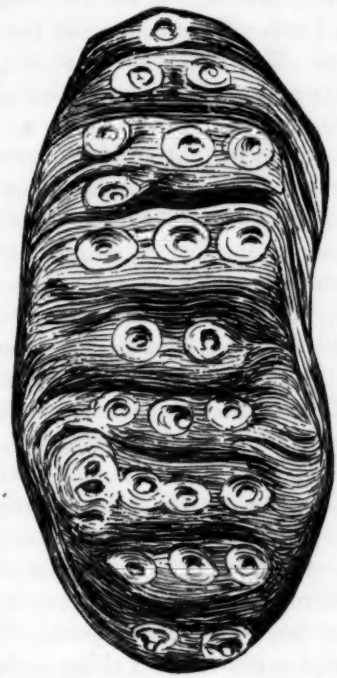
H. B. Guppy (*Observations of a Naturalist*, p. 403, 1906) notes that species of two other floral genera—*Canarium* and *Elaeocarpus*—furnish food for Fruit Pigeons. Of *E. graeffei*, he found the stone in this pericarpal fruit measure 3–5 centm. Of Canarium, with its large drupe, the "pit" was 2 cm. in length. The distribution of this tree in Fiji is mostly by Fruit Pigeons, in whose crop Guppy found fruits measuring 25 × 28 mm.

Seeman also mentions the drupes of *Couthovia corynocarpa* as part of the dietary of the Fruit Pigeons of Fiji.

Of course the part played by the gizzard in the mechanics of the digestive function in this Fruit Pigeon is made quite plain by dissection. None of the hard parts of the nut are crushed or macerated, as one might conclude from some writings on the subject. That portion of the fruit actually digested is in all instances only the soft, outer coverings especially the nutmeg arillus; the woody testa with its contents pass through unchanged, while the aril with, rarely, the pericarp, is ground off the inner shell and reduced to pulp by the action of the horny processes, set in the contracting and expanding muscle layer of the gizzard, before it passes into the lower intestine. This explains, by the way, the wide distribution of *Myristica*, and perhaps of some other species, whose fruits, the chief diet of these Pigeons, are planted far and wide over the Islands.

It is difficult to believe that the throat and gizzard of *Globicera* can permit the passage and retention of such large masses as are not infrequently found in the oesophagus and stomach; indeed it is a question how large a fruit this pigeon *can* swallow. Occasionally a bird manages the entire mass of one of the smaller nutmegs,

pericarp and all, but as a rule only that portion of the fruit freed of its outermost covering is swallowed. Many entire, wild nutmegs are so large that one may confidently assert that they could not be swallowed by even the most expert bird. For example, the writer obtained from a *Myristica* near Tamavua Station, Viti Levu, many fruits in all stages of development. These were, as



INNER SURFACE OF GIZZARD OF POLYNESIAN FRUIT PIGEON.
Actual length 2.50 ins.

usual among nutmegs, borne in pairs, and the irregularly rounded bilobed pericarp of the largest measured 16.3 cm. in its smallest and 17.5 cm. in its largest circumference. On section the stone measured 12.5 × 25 mm. with the arillus in place. The pericarp closely resembled the outer covering of our butternut, was very thick and tough and not easily cut even with a sharp knife. It did not, however, stain the fingers. In this collection were also numerous small, immature nutmegs, but none of them gave out the characteristic spicy odor.

The mucosa of the Pigeon's gizzard—as is well-known to be the case in other birds—is sometimes stained by the soluble pigments in the ingested food. It is probable that, in the Nutmeg Pigeon, the yellowish discoloration around the bases of the cones may be due to this cause. The remaining mucous and submucous membranes were of the usual color.

As will be seen by the figure, the bisected gigerium measures 6.3 cm. by 1.5 cm. The thickness of the walls varies from 2.5 mm. to 4 mm. The arrangement of the cones on their muscular base differs somewhat from that found by Garrod in *C. latrans.*

Although there are, as in that species, 23 well-defined conical processes yet they are not placed, so far as the present writer's investigations show, in the regular order described by him. As shown in the accompanying illustration, only nine cones answer to the author's record of regular disposition in combined lines and columns of three. The remaining fourteen are in *pacifica* irregularly scattered—two lines each of two's and three's and two singles—covering pretty thoroughly between them the whole inner surface of the stomach. This disposition of the gizzard cones was found to be practically constant in all the Nutmeg Pigeons examined by the writer. The height of the cones and the diameter of their bases correspond closely to the figures furnished by Garrod except that in *pacifica* the basal structures appear to be of the same diameter (about 5 mm.) in all, regardless of their height, and not as great as that recorded in *latrans;* yet this difference may be chiefly due to methods of measurement. While the mucous membrane presented a smooth and shiny surface throughout it was plicated between the rows of cones, as one might expect of the lining of an organ subject to frequent distention by the forcible entry of large bodies into its interior. The artist has not, in the illustration, succeeded in portraying very successfully the elevation of the pointed cones nor the entrance of the oesophagus and duodenum, but as the main purpose of the drawing is to show the disposition of the cones and the relative size of the whole organ, this defect is not of much practical importance.

Museum of Vertebrate Zoology,
University of California, Berkeley, Calif.

IS PHOTOPERIODISM A FACTOR IN THE MIGRATION OF BIRDS?[1]

BY G. EIFRIG.

IN an article published in the 'Journal of Agricultural Research,' March 1, 1920, by W. W. Garner and H. A. Allard of the Department of Agriculture "data were presented tending to show that the length of day may exercise a remarkable regulatory action in initiating or inhibiting sexual reproduction in plants." This they supplemented by an account of extremely interesting and clever experiments which prove beyond cavil that length of day has much more to do with the time of flowering and fruiting of plants than had hitherto been supposed. This is in the 'Yearbook' of the Department of Agriculture for 1920, published 1921. It had been thought, and perhaps most people still think, that the flowering and fruiting of plants are purely a matter of temperature, moisture, soil ingredients and soil structure, plus internal causes in the plants themselves. But by placing plants daily for seven to twelve hours in the light and then into a dark shed they were able to induce plants like golden rod, cosmos, bidens or beggarticks and others that normally flower in September and October, to do so in July or earlier, and vice versa by subjecting to light such plants as poppies, iris, rhododendron, columbine, etc., they forced them to flower in mid-winter. Needless to say they had control beds of the several species under experimentation under normal conditions. Their technique was so simple that one is forced to admit that they proved their point. In the number of 'Science' of June 2, 1922, the authors propose to call this phenomenon photoperiodism, the response of the plant to length of day and night. There it is stated that the varying amount not only determines the quantity of photosynthetic material elaborated by the plant, but also the use the plant can make of this material.

The purpose of the present paper is to show that this same phenomenon plus the actual cause of it, the moving of the sun's rays

[1] Read at the meeting of the American Ornithologists' Union, Chicago, Illinois, October 24, 1922.

from the Tropic of Capricorn to the Tropic of Cancer and back probably is a factor in the migration of birds, and possibly a more potent one than we would suspect.

Let me quote a few sentences from the 'Yearbook,' p. 379: "Change in temperature fails to explain why plants, flower and fruit at certain periods; that is to say, even though the appropriate temperatures are provided out of the regular flowering and fruiting season, as a rule the flower and fruit fail to appear except in their usual seasons." "There are no temperature differences during the summer months which could explain these differences in time of flowering; and, since "internal causes" alone can not be accepted as furnishing a satisfactory explanation, some external factor other than temperature must be responsible." "Some other factor is responsible for the failure of cosmos to blossom during the summer months. In this respect the behavior of cosmos is just the opposite of that observed in iris." Similarly one who watches the coming and going bird cannot but feel that there must be other factors, impulses and stimuli than those usually assigned. Occasional occurrences in the migration stand out in bolder relief than others and make one ponder what hidden influences can be at work here.

What are the causes usually given for the wonderful phenomenon of bird migration? For the southward migration in the northern hemisphere it is the failing food supply due to the approach of winter. And there can be no doubt that the hosts of waterbirds, that remain in the north as long as they can, are forced south by the freezing over of the waterbodies and swamps, their source of food. For the northward migration in spring the causes usually given are the physiological changes going on within their bodies, mainly in the sexual organs, coupled with a love of the home they were born in, plus a desire for greater privacy in their domestic affairs during nesting time. Aside of the fact that the last two reasons assigned are too anthropomorphological, too much patterned after our human feeling and sentiment, to be scientific, if their love of the home of their youth is so great, why do so many leave it in summer the first chance they get, even deserting their young, when they are not yet able to go on the journey? However, let us reserve this phase for later. The first reason, the physio-

logical changes no doubt holds good in those species that arrive here already mated, as some of the ducks.

But what about the vast number of species in which the reasons given either for the southward or northward migration, or for both, clearly cannot apply? The occurrence that forced such a conclusion on me is this. Our autumn in the Chicago area is usually remarkably fine, sunny, mild, open for a long time, but the fall of 1920 was so to an extraordinary degree. It seemed as though frost and winter wanted to stay away entirely. The hosts of Juncos, Tree Sparrows and Fox Sparrows, and others, arrived from the north as usual, and filled our woods. And yet, although the temperature remained abnormally high for weeks, higher than the average, although there was more sunshine and less wind than other seasons, and the food supply seemed undiminished, they drifted southward, their flocks thinned out, our woods became deserted as usual, when all conditions are more unfavorable. Finally a few stragglers only were left behind. What made these armies leave when all conditions were so favorable and unchangedly so? The decreasing length of day, the beckoning of the sun going south, I say.—On the 2nd of July last year there were numbers of northern shore birds at Hyde Lake, in the southeastern part of Chicago, such as Pectoral and Least Sandpipers, Lesser Yellowlegs, Jacksnipes, etc. On July 10th, there were flocks of Pectoral Sandpipers along Salt Creek, Addison, near Chicago, still in their nuptial plumage and the same can be observed every year. Why are the Warblers and Shore Birds so anxious to leave their northern home in July, that they in most cases cannot take their young along on the trip, these being yet too weak to embark on such a journey? No one can say it is because of lack of food, for the food supply is then at its height. Neither can it be said that they are fleeing before the approach of winter, because then for a while the temperature is on the increase rather than decrease. Is it coincidence that they leave as soon as possible after the sun has reached its northernmost point over the Tropic of Cancer on June 21st, or is there a causal connection? Similarly the Swallows, Flycatchers and even the Blackbirds, begin to get restless and drift southward. May not the shortening of the day due to the sun's traveling toward the equator be the answer to the problem?

When unusually large numbers of the erratic northern winter visitants come into our latitude, such as the Pine and Evening Grosbeak, the Bohemian Waxwing, the two Crossbills, we are prone to say that this is owing to a failure of their food supply in the far north, of the pine seeds and mountain ash berries. Who is then so far north to reliably investigate and report on this? May it not be that the extreme shortness of daylight in the far north does not leave them enough time to satisfy their usually voracious appetite? May not that be the physiological, material background to the situation, that urges the birds southward into a region of longer days in winter and again northward into the region of longer sunlight in summer?

Let us now scrutinize the northward migration in spring more closely. Hereabouts Bluebirds, Robins, Meadowlarks and others often arrive during the second half of February; the Prairie Horned Lark (*Otocoris alpestris praticola*) at the same time at Ottawa, Canada; there I have also seen the Tree Swallow arrive in numbers on the 28th of March, when there was little to show that spring had come except that the days were getting longer. No one can say that such early comers, that nest two or three months later, are urged so early by physiological stimuli. At least dissection does not show it. Specimens taken of such early arrivals show as little enlargement of the sexual organs as do specimens taken in fall. Again, may not the lengthening of day be the stimulus urging them northward in addition to some of the reasons usually given?

We know how unfavorable weather conditions may retard the spring migration. This is especially noticeable in those species that do not leave the country in winter, not so much in those that come from South America. We can easily see how the former can sense unfavorable meteorological conditions that are spread over a large part of the United States. The latter arrive later in the season on our shores, by which time unseasonably cold weather occurs more rarely. But when such is the case, as in that memorable spring of 1907—I remember that on a visit to St.Louis from Canada that spring I found people in that southerly metropolis wearing heavy overcoats and furs on the 19th of May, when usually it is quite warm there—the birds, even the tender warblers, will finally break through without waiting for a change in temperature,

as though some force compelled them, often to their own undoing, as in that year, when untold numbers of warblers perished from here northward. And year after year you can find species such as the Vesper, Chipping and Field Sparrows, the Flicker and others appearing here on about the same day as in other years, even though the weather is raw and cold and has been so for some time back. All such cases can be explained beautifully on the assumption that the lengthening of day is one of the compelling and controlling factors.

Finally—but this is only a by-product, so to say—would it not be a grandiose conception, the finding of a new chord in the grand harmony of the universe, if it could be assumed that the great, majestic source of life on earth, the efficient regulator of mundane things, the sun, were also the regulator, the driving force in this wonderful phenomenon, the migration of birds! There the sun is on the 21st of December over the Tropic of Capricorn in the southern hemisphere and then slowly starts on its journey northward, taking along with it wave after wave of feathered denizens of light and air. On March 21st, the vernal equinox, it is over the equator, where there are twelve hours daylight and twelve hours night throughout the year. Now the days are rapidly lengthening in the north until June 21st, the summer solstice, when we have daylight from 16 to 24 hours in the northern hemisphere. Then also comes the climax in the life activities of our birds, the nesting period. But before this is entirely over in many species, a change becomes noticeable again, the days are becoming shorter, for the sun has started toward the equator, again taking millions of Warblers and Shore-birds along with it southward, before the young birds are able to go along. It must be a potent factor that urges them to seemingly forget their young. We know that in September even certain insects like the Monarch Butterfly and the Migrating Dragonfly (*Aeschna heros*) migrate south in vast armies, and we certainly cannot ascribe much thinking capacity or sentiment to them. If the sun is potent enough to bring from their hibernating places in the mud of ponds and swamp bottom the millions of frogs and turtles, and from their burrows, oft deep underground the innumerable rodents, I see no reason why it should not be potent enough to influence and regulate the move-

ment of the bird armies. When the sun is able in spring to loosen the tiny spark of life in the billions of seeds of plants in the ground, why should it not be equally able to turn the direction of the movement of birds into the direction of its own movement?

Concordia Teachers College,
River Forest, Ill.

THE SONG OF THE SONG SPARROW.

(A SYSTEMATIC STUDY OF ITS CONSTRUCTION.)

BY WILLIAM C. WHEELER AND JOHN T. NICHOLS.

ALL field ornithologists are familiar with the great variation in the song of the Song Sparrow. We are not aware, however, that any analytical statistical study thereof has been published. It therefore seems worth while that we place on record a summary of our graphic interpretation of 197 different Song Sparrow songs. These were obtained (W. C. W.) through many hours of careful listening to Song Sparrows in the field, all within a single song season (1923) and, furthermore, all in eastern Massachusetts. Since then this mass of material has been analyzed and studied (J. T. N.), with a view to determine what bearing it might have on current theories and hypotheses regarding bird song.

A few words as to our method of setting down each song graphically: Musical notation is almost out of the question in a case of this sort. Such notation does not clearly show the construction of the songs. It is the construction which the ear uses in differentiating one song from another, and which it is possible to represent graphically in a moderately satisfactory way. The individual bird is capable of modifying both pitch and quality to some extent. Of the four elements found in a Song Sparrow's song, namely, time, pitch, quality, and construction, although construction may be somewhat variable, we believe it is the most reliable factor on which to base a critical study. In making a graphic record of song, we have found the symbols shown in figure 1 of the accompanying chart most satisfactory for this particular species.

Setting down a song in this manner places the emphasis on construction. Relative pitch is indicated by the relatively higher or lower position of the symbols. The key in pitch was never taken, although an exceptionally high pitched song would be so noted on the record. Quality was noted sometimes by writing under the symbols the suggested pronunciation. Time was only distinguished as implied by the different symbols, which see. Even though we have disregarded, to a great extent, the musical element of the song, we have, in our opinion, some very satisfactory sheets of Song Sparrow songs, recorded in a system advantageous for comparing the construction of one with another.

The typical Song Sparrow song consists of short introductory notes, a central trill, and a flourish of notes or slurs at the end. The first thing that has struck us in attempting analysis is that, holding to this general form, songs may be classified in two groups, A and B. Two examples, one of group A and one of group B, are shown in figure 2 of the chart. It will be noticed that the main difference between the two groups is that the trill is higher in pitch than the introductory notes in the case of the A group, while in B it remains on the same pitch as the introductory notes.

Frequently a single bird has been found to have several songs. In most cases these songs are related somewhat to one another, that is, they belong to the same group. This is not invariably the case, however. A certain Song Sparrow sang the two types of song shown in figure 3.

The data is not sufficient to say definitely whether this is an unusual case or whether it is frequent for Song Sparrows to sing both types of song. To absolutely clear up this point it would be necessary to keep very close watch on a particular individual bird for some time, which was attempted in but few cases.

The maximum number of songs heard from one bird was 19, a small selection of which appears in figure 4. The main characteristic of these songs illustrated is that they are unlike any type, being very irregular and following no rule or form. It is our hypothesis that such irregular variable singing is the primitive song of the Song Sparrow which tends to become standardized to the double type of groups A and B.

If one listens closely for some minutes to a singing bird, one will

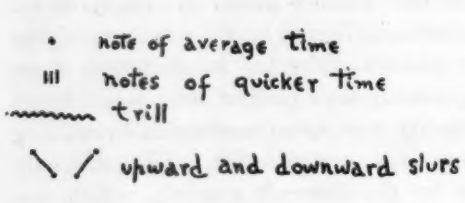


fig. 1

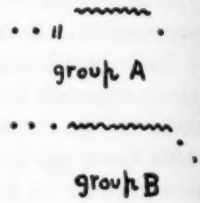


fig. 2

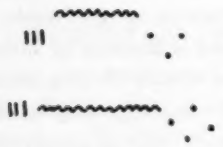


fig. 3

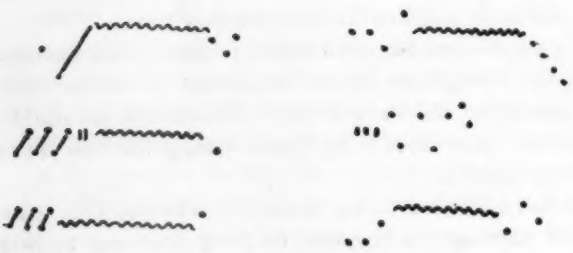


fig. 4

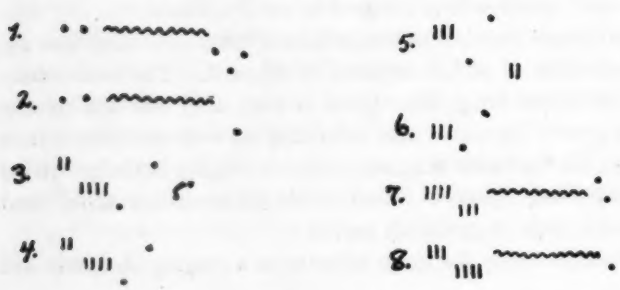


fig. 5

note sometimes a tendency for essentially the same song to change from complex to simple, in other words, instead of building up, it becomes shortened. To illustrate this point more clearly, we give our graphic record of 8 songs sung in succession during a period of a little less than 20 minutes by an individual Song Sparrow in figure 5. Each song was sung several times, Nos. 2, 4, 6, and 8 almost identical with Nos. 1, 3, 5 and 7, respectively. It is frequently noticeable, as in this case, that when a Song Sparrow simplifies the ending of a previous song, he is about to change into an entirely different song. Notice also the first two songs of this bird are true to group B, the middle songs are irregular, while the last two songs are approaching type again, and with the omission of one or the other of the two sets of introductory elements would be typical group A or group B songs. It seems to be the general rule that the more variations a bird sings the farther away from type it gets,—hence the hypothesis that Song Sparrows singing unlike any type, tend to revert to type, it being only a question of time before a bird will sing a true model song from either group A or B. Too few of our records follow an individual bird through a sufficient time period, likely to involve a pause in its singing, to present this phase of the subject, except as an hypothesis.

Fancy a Song Sparrow perched on a maple branch along the edge of the brook, pouring out its songs, gradually drifting away from type, "going off on a tangent" as it were. He suddenly brings to a close his irregular songs, perhaps original, perhaps merely careless, and returns to type. It seems that this holding to type is one of the striking features of Song Sparrow singing. How much, if anything has mimicry to do with it? Would not mimicry, by introducing chance elements from this side and from that, tend to break down rather than establish a standard or type song? Certainly there is no standard construction to the songs of those recognized mimics, the Starling and the Mockingbird. On the other hand, when we consider that Song Sparrows are abundant and widely distributed across America, with proven ability of song variation, some factor must be present to hold their song as closely as it is held to type.

When a Song Sparrow sings irregularly away from type, its song

is difficult to record for several reasons. First, this song is composed of a greater complexity of notes. Then the same song is seldom repeated, whereas ordinarily a bird sings the identical song several times, allowing opportunity to check up and correct for error. The bird which possessed 19 songs was difficult to record (see figure 4). The still more irregular and sometimes more or less continuous songs heard in late fall are practically impossible to record satisfactorily.

The Song Sparrow has a fall song which is quite unlike its ordinary summer performance. It is made up of notes similar to those used in summer, but lacking the volume of the summer song and connected by a wheezy trill, so that such singing is continuous. There is no evidence to hand as to whether or not this be the song of young birds,—though at the same season that it occurs one occasionally hears a regular song, like those heard in summer. The irregular singing of the bird illustrated in figure 4 approached this fall song; and as it occurred July 1, rather late, it may easily, as fall singing certainly is, have been from a bird not nesting at the time.

This brings us to our hypothesis of the evolution of the variation of song in general and Song Sparrow song is particular. Of various factors by which song is controlled, one important one seems to be the physiological condition of the singer, which we will speak of as the factor for expression. A second factor, scarcely to be denied in view of recent observations and discussion, is fixing the nesting site by repetitive singing. The short, definite, incisive summer Song Sparrow singing may well have been derived from a continuous, irregular song of a more warbling nature resembling the fall song, and this latter be the more primitive. Utility in fixing the nesting site by repetitive singing favors development of a short, incisive song. From studies of Gross[1] on the nesting habits of the Dickcissel there seems little doubt that this factor has become very important in the song of that species, and what a short, incisive song it has! Also, song of a warbling nature is very wide-spread among birds of the Sparrow family, as their primitive song type should be,—note the Finches. In fall, when the dry trill of the

[1] Gross, A. O., 1921, 'AUK,' XXXVIII, Nos. 1 and 2.

Chipping Sparrow is no longer heard, it occasionally has a weak warbling song of some sweetness.

It would seem that when Song Sparrows are through nesting for the season, a standard type of singing being no longer of particular advantage, they tend to return to primitive irregular singing when still subject to the song impulse.

As regards the double standard, group A and group B songs, we have no satisfactory hypothesis to advance therefor. It would seem to be a rather general character in the song of many species, however, and doubtless is more than chance variation. Most Warblers have two types of song, each individual singing both. We have in mind a certain Parula Warbler which for some time sang one type almost exclusively in the morning, changing to the other as the day waned. Among birds having obviously two different songs are the Swamp Sparrow and American Redstart. In the case of the Redstart the two songs are sometimes sung in regular alternation with practically the same lapse of time between each song, while the Swamp Sparrow may sing one song over a period of time, and then, after a lapse of silence, change to the other song.

A little philosophizing on the part which imitation and originality may be supposed to play in Song Sparrow song variation, according to our concept, will not be out of place. All individuals may be supposed to inherit the indefinite continuous primitive song, and the tendency to replace it when nesting with a short incisive song of one or both of two types. Chance combined with a minimum of imitation or originality accounts very nicely for the observed result. If imitation were an important factor there would be a tendency for a single type to become dominant in a given area; if originality, a tendency for the two types to become lost in a multiplicity of design.

Like various other birds, the Song Sparrow has a flight song, which, in that it is sustained, continuous and irregular, has much in common with the fall song mentioned above. It differs strikingly therefrom in being given with increased rather than diminished volume and emphasis, and in its most typical form is frequently associated with chase of a rival male.

There can be no doubt that this flight song can be correctly

considered an emotional outburst into which the bird throws its entire vocabulary. The (so considered) primitive fall song would seem to be the background, but the standard ("nesting site") song is also present, and frequently the bird's two common call notes repeated one or more times with emphasis at the beginning. We believe we are safe in the assumption that this flight song is rather the emotional lifting of the flood gates of voice than any specialized structure raised on the standard song as a foundation.

A little reflection leads us to believe that the principles underlying its flight song, for the Song Sparrow, may be traced in flight songs of other birds. The flight song of the Meadowlark is a comparatively sustained performance, of which the standard song forms a part, and it is interesting and likely significant that it contains also liquid bubbling notes suggestive of the voice of the western Meadowlark, which notes are very likely primitive, inherited from the common ancestor of these two birds. The well-known flight song of the Ovenbird contains elements of its standard song, combined with call notes, and to us is much more suggestive of the songs of its relatives, the Water-Thrushes, than is its ordinary performance. This flight song of the Ovenbird, as well as that of the Maryland Yellowthroat, is not infrequently heard when the song season of each has waned. We explain this by supposing that whereas fall recrudescence of the impulses which lead to song, is doubtless weak in comparison with these impulses at the height of the nesting season, it does not expend itself in standard singing and other nesting activities, and therefore accumulates sufficiently to give the emotional flight song.

The above discussion is based on our recorded data, which have to do almost exclusively with the construction of the song. As a matter of fact, Song Sparrow song varies in other ways than in construction. For instance, in pitch, and in that subtle quality which may be designated as pronunciation. Although we have not the data at hand to substantiate such an opinion, we suspect that there is variation, regional or geographic in nature, in pitch, pronunciation or both, whereby it might be possible with sufficient familiarity to separate birds of one locality from those of another. Such might readily come about through imitation of tone values or their inheritance by a group of Song Sparrows through some common ancestor.

In writing this paper we have attempted, first, to present a summary of observed data on Song Sparrow song variation in one area; second, to call attention to the method of recording such data that we have found serviceable; and, third, to touch on lines along which it may be possible to analyze and explain bird song. We believe that having done this will be important just in so far as it leads to criticism, further observation, in short, continued investigation and discussion of the subject.

The editor has permitted us to add this note since the interesting article on bird song by A. A. Saunders in the April 'Auk', based on similar subject matter, has been available for study. Mr. Saunders has aimed for greater musical precision in his records and apparently has not been struck with any two main types into which Song Sparrow songs may be divided. In so dividing them we have used what we have translated as pitch of the main trill. Possibly what we have called pitch would be more readily recognized or translated by some observers as quality.

American Museum of Natural History,
New York.

BIRD BANDING AT THOMASVILLE, GEORGIA, 1924.

BY JOHN B. MAY, M. D.

Plates XXVII–XXVIII.

IT was my happy privilege to spend nearly three months, from January 6 to April 10, 1924, carrying on the bird-banding operations at Thomasville, Georgia, which were begun there in 1915 by Mr. S. Prentiss Baldwin of Cleveland. Several accounts have already been published in the pages of 'The Auk' describing the results of previous years.[1]

As the location and history of the Thomasville station are known to the readers of these previous reports, I shall confine myself in this article to merely recounting the actual results of my own activities compared with those of my predecessors.

[1] "Recent Returns from Trapping and Banding Birds." S. P. Baldwin, 'The Auk,' Vol. XXXVIII, April, 1921.
"Adventures in Bird-Banding in 1921." S. P. Baldwin, 'The Auk,' Vol. XXXIX, April, 1922.
"Bird Banding at Thomasville, Georgia, in 1922." L. R. Talbot, 'The Auk,' Vol. XXXIX, July, 1923.
"Bird-Banding at Thomasville, Georgia, 1923." T. E. Musselman, 'The Auk,' Vol. XL, July, 1923.

Owing to illness, Mr. Baldwin was only able to spend about three weeks at Thomasville this year, arriving the last of February, and during part of his visit I was called north on business. On January 28 Mr. S. E. Perkins, III, of Indianapolis, joined me for a fortnight, assisting with the banding and introducing several novel ideas in trapping devices. A few days later Mr. Frederick C. Lincoln of the Biological Survey joined us for ten days.

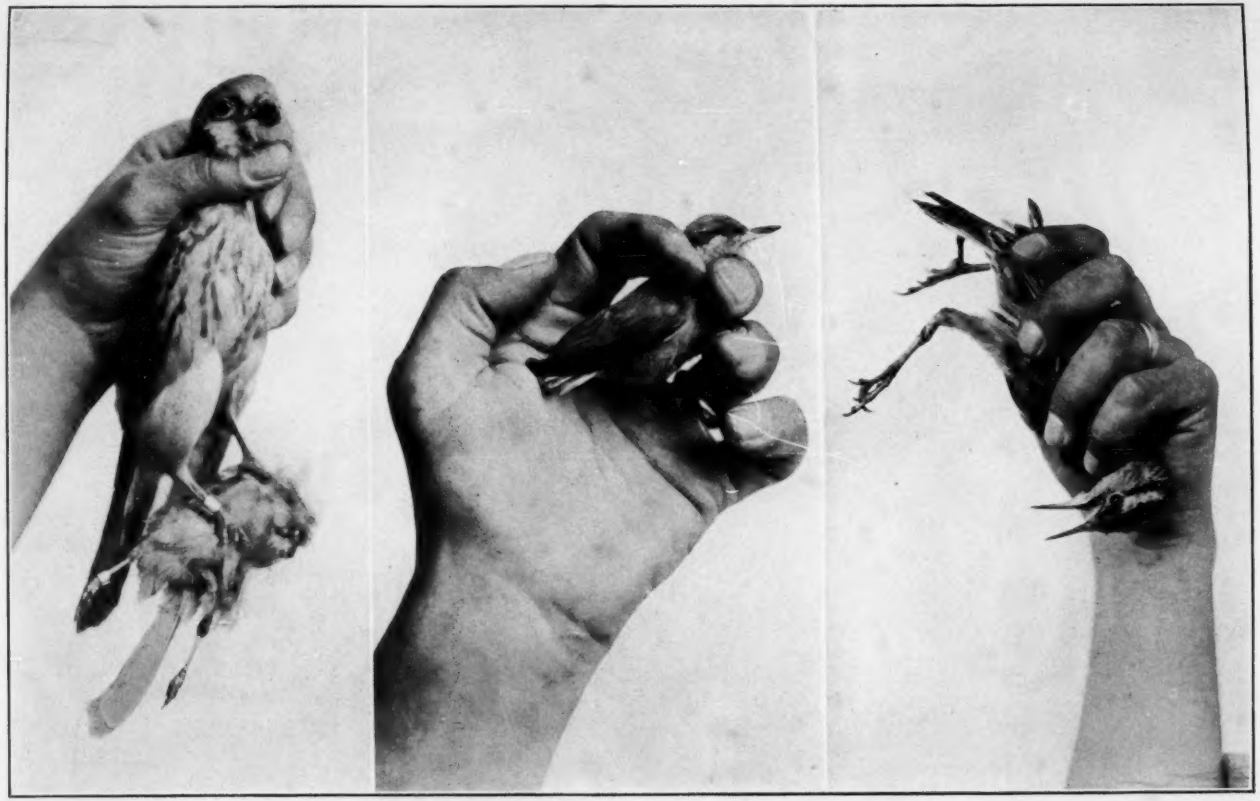
The season proved an exceptionally cold one for south-western Georgia, the thermometer having registered only thirteen degrees above zero a few days before my arrival, and frequently going below freezing during my stay. The native flora was apparently little affected by this weather, but the exotics were badly frozen in many cases. Oranges, kumquats, camphor trees, palms, and Japanese magnolias were brown and dead-looking, and the bird life was undoubtedly much affected by the conditions.

Chipping Sparrows, usually the most abundant birds during the banding operations at Thomasville, were absent in January. February first a small flight appeared, fourteen being taken that day, but cold weather followed and they apparently retreated southward, not becoming abundant until the middle of March. At this latter time some of the birds banded in early February reappeared.

Pine Warblers were very common, and during the cold weather came in numbers to the traps, eating cracked corn, bread crumbs, raw peanuts, cocoanut meat, etc., and even eating the suet fastened to trunks for the woodpeckers.

Probably due to the weather conditions, this year's results were rather disappointing in quantity in comparison with Mr. Musselman's records of 1923, when he banded 610 new birds and trapped 73 "returns." His total of 4031 new birds, "returns" and "repeats" in forty days, an average of one hundred daily, is far ahead of my 2141 in seventy-seven days.

In variety of species, on the other hand, my "catch" was much richer than that of any previous season, totalling thirty-seven species and sub-species, fifteen of which were new to the Thomasville station. The numbers in the following table represent individual birds, not "repeats." The newly-recorded species are marked with an asterisk (*).



1. SPARROW HAWK WHICH ENTERED TRAP AND CAUGHT A BANDED CARDINAL. 2. BROWN-HEADED NUTHATCH. 3. MEADOWLARK WITH OLD HEALED FRACTURE OF TARSUS.

UNIV. OF MICH.

Birds caught at Thomasville, Ga., January 18 to April 9, 1924.

Species	New Birds	Returns	Total
Mourning Dove	42	0	42
Sparrow Hawk*	1	0	1
Southern Downy Woodpecker*	1	0	1
Red-bellied Woodpecker	4	0	4
Flicker*	1	0	1
Phoebe*	1	0	1
Blue Jay	0	2	2
Florida Blue Jay	7	2	9
Meadowlark*	32	0	32
Vesper Sparrow*	18	0	18
Savannah Sparrow*	16	0	16
Grasshopper Sparrow*	1	0	1
White-throated Sparrow	7	1	8
Chipping Sparrow	131	23	154
Slate-colored Junco	13	0	13
Song Sparrow	2	0	2
Swamp Sparrow*	2	0	2
Towhee	3	1	4
White-eyed Towhee	5	0	5
Cardinal	13	12	25
Cedar Waxwing*	4	0	4
Loggerhead Shrike	1	0	1
Myrtle Warbler	42	2	44
Pine Warbler	72	2	74
Palm Warbler	1	0	1
Yellow Palm Warbler	5	1	6
American Pipit*	1	0	1
Brown Thrasher	16	5	21
Mocking Bird	4	2	6
Carolina Wren	2	0	2
Southern White-breasted Nuthatch	0	1	1
Brown-headed Nuthatch*	2	0	2
Tufted Titmouse*	2	0	2
Ruby-crowned Kinglet	1	1	2
Hermit Thrush	8	0	8
Robin*	1	0	1
Bluebird*	1	0	1
37 species and sub-species	463 new birds	55 returns	518 total

Again comparing with the 1923 records, I banded 131 Chipping Sparrows and 332 birds of other species, against 519 Chippies and only 93 birds of other species in 1923. Mr. Talbot had banded 258 Chippies in 1922, and Mr. Baldwin 220 in 1921, so that the scarcity of these birds is very noticeable.

The banding of Mourning Doves was one of the principal objectives of my trip to Georgia, as the Biological Survey wished to make a special study of this bird's movements. Being considered a gamebird in many states, a good percentage of returns could be expected, as sportsmen could be relied upon to report any banded birds which were killed. Mr. Talbot had banded one in 1922, and Mr. Musselman six in 1923. One of the latter birds, 113975, was banded March 24, 1923, and was killed a mile south of Thomasville on Dec. 29, 1923. This of course was negative evidence as far as migration was concerned, as the bird might either have ermained in Georgia the entire nine months or travelled hundreds of miles to a northern breeding place and then returned.

I had been advised to bait and trap in a certain field about two miles from my headquarters, where Doves usually congregated by hundreds and even thousands. Some new traps were made from suggestions of Mr. Lincoln, which we named "clover-leaf" from their outlines, and later when Mr. Lincoln himself joined me, we put out a large "spring-pole" net of the type which he had used so successfully in trapping Ducks for banding. (See 'The Auk,' Vol. XXXIX, July, 1922, "Trapping Ducks for Banding Purposes," by F. C. Lincoln.)

For some unexplained reason Doves were scarce and this field, usually the haunt of great flocks, was visited only by small numbers this year and they came very slowly to our bait. Later other traps were located in a stubble field nearer headquarters, and a total of 42 birds were banded at the two locations, several of which repeated occasionally. The exposed locations of these traps, at a distance from houses, made them easily observed by predatory birds or animals, and several Doves, as well as Meadowlarks, were killed and partly eaten in the traps, between my visits. In one case, large footprints indicated the possibility that the culprit was a Red-tailed Hawk which frequented the field, though the actions of Crows in the nearby woods suggested the presence of a Barred Owl.

The only bird of prey captured was a female Sparrow Hawk, taken one Sunday afternoon in an ordinary sparrow trap of the well-known "government" type, the unintentional bait being a female Cardinal, a return bird of 1923. As one of these birds

frequented a nearby field where Sparrows, Warblers, and Bluebirds abounded, and apparently in perfect peace with them, often being seen perched within a few feet of the smaller birds, it was banded and photographed, and then released to see whether it would repeat its misdemeanor. After perching a few moments on a tree near the traps, it circled about and flew away across a wooded "branch" towards the field mentioned above, and on later dates I was quite sure that I saw the band on the bird's leg as it perched on its favorite telephone poles. The Hawk did not return to the traps.

Woodpeckers were abundant at Thomasville, the Redbellies and Redcockades being especially noticeable, with Sapsuckers third in noisiness. Owing to the failure of the local tinsmith to make the traps which he promised, little attempt was made to trap these birds, but the Redbellies came to the sparrow traps with fair regularity. They were interesting birds, clambering Parrot-wise about the traps when approached, and squealing and biting when handled. A female Downy was taken from its nest-hole one evening, and one big Flicker came under a pull-string trap while I was watching a pair of Cardinals feeding there. He flew down in a most business-like manner, and hopped under the trap without hesitation, frightening the Cardinals away before I could twitch the string.

The same pull-string trap was responsible for our one Phoebe, caught under rather amusing conditions. Mr. Perkins, watching the Phoebe fly-catching in a tree over the trap, conceived the idea of using an artificial fly as a lure. Two feathers from a Bobwhite were tied together and suspended inside the trap, so that they swayed in the light breeze. The next day Mr. Perkins saw the Phoebe light on the ground near the trap, hop towards it, and finally hop under the net. Without waiting for the bird to actually attempt to catch the fluttering feathers, he pulled the string, and Phoebe went on the records as No. 124975.

Blue Jays were captured fairly easily, but only two were the Northern type, both returns from 1922, the others being the Southern sub-species, easily distinguished in most cases in the field.

Meadowlarks were new to the Thomasville station, but they

came to my dove traps readily and in several instances repeated, even when released two miles from the point of capture. They were apparently of two sub-species, as there was a decided difference in size, but I did not have the facilities for positive identification in the field.

The stubble fields about the plantation were teeming with Sparrows of several species, though the grounds immediately around my cottage, where Mr. Musselman had banded his five hundred Chippies, were for some reason taboo while I was there. Vespers and Savannahs came into my dove traps frequently but most of the latter escaped through the one inch poultry wire mesh before I could get them into a receiving cage. Field Sparrows were common but none were banded. Just before my return North a sparrow trap was placed in an opening in a broom straw field and three Swamp Sparrows and a Grasshopper Sparrow were captured, one of the former being killed by a Cotton Rat, however. During my temporary absence in March, Mr. Baldwin trapped and banded two Song Sparrows, probably migrants just passing through, and one of them kindly repeated for me on my return so that I could have the species on my own list.

The interesting group of White-throated Sparrows which have haunted the shrubbery around the main house ever since Mr. Baldwin began banding there in 1915, was smaller than usual, and it was a long time before I trapped any of them there. Only one "return" was taken, 48698, banded March 17, 1921. It repeated March 29 that year, skipped 1922, returned in 1923 on March 10, 13, 17, and 23, and I recorded it on February 3, February 27, and March 31, 1924.

I had hoped to be able to throw further light on the foot disease attacking Chipping Sparrows, which Mr. Musselman has been investigating, but not only were the birds very scarce, but almost none showed any signs of active disease. Many birds had one or more toes or even an entire foot missing, but they were old, healed cases, and I was unable to send any fresh cases to Washington for pathological examination.

One Chippy had fractured its leg above the tarsus and it had healed with only slight distortion. A Savannah Sparrow and a Meadowlark were also found with fractured tarsi which had healed with very little deformity.

Cardinals were conspicuous at all times, and were interesting subjects to watch and to handle. And one needs to be watchful in handling them, for their powerful beaks are capable of giving quite a painful "nip." Often the return birds showed badly squeezed and scarred bands, and I was obliged to replace several of the old thin bands with newer ones.

Twelve of the 25 Cardinals handled were "returns," one from 1920, two from 1921, one from 1922, and eight from 1923. As twenty birds were banded in 1923, this was a return of forty per cent.

Towhees were present throughout my stay, but only one return bird was taken, 41516, banded by Mr. Musselman. This bird repeated day after day and showed a very catholic taste in traps, sometimes reporting the same day in traps a quarter of a mile apart. This was in contrast to the White-throats which seldom left the shrubbery immediately around the main house.

No White-eyed Towhees were trapped until March 24, when two were taken, another on the 30th, and two on April 8. Red-eyes were still present on this latter date.

A pleasant interlude was caused by a visit from a large flock of Cedar Waxwings, which appeared on February 22, absolutely stripped the berries from several large privet bushes around my cottage, then moved on to the hollies and cedars by the main house. A pull-string trap was set for them, baited with the usual chick-feed and crumbs, with sliced apple and sprays of privet berries added, and on February 24, I caught three Waxwings on one twig of privet. The next day added one more before they moved on, but after that I was unable to entice them to the ground.

Shrikes were common, and I had been warned of their destructiveness about a banding station, so decided to eliminate them as far as possible from my terrain. My score with the trusty "game-getter" was clean for the first eight but I missed the ninth. Then eight more in succession made the tally like "free silver," sixteen to one. This campaign probably saved many trapped birds from destruction (see Mr. Musselman's article) but in spite of my vigilance a Shrike got into one of the sparrow traps and killed a Hermit Thrush. Instead of pronouncing summary vengeance, I banded and released the Shrike to see whether it

would return but like the Sparrow Hawk, it did not repeat during my stay at Thomasville.

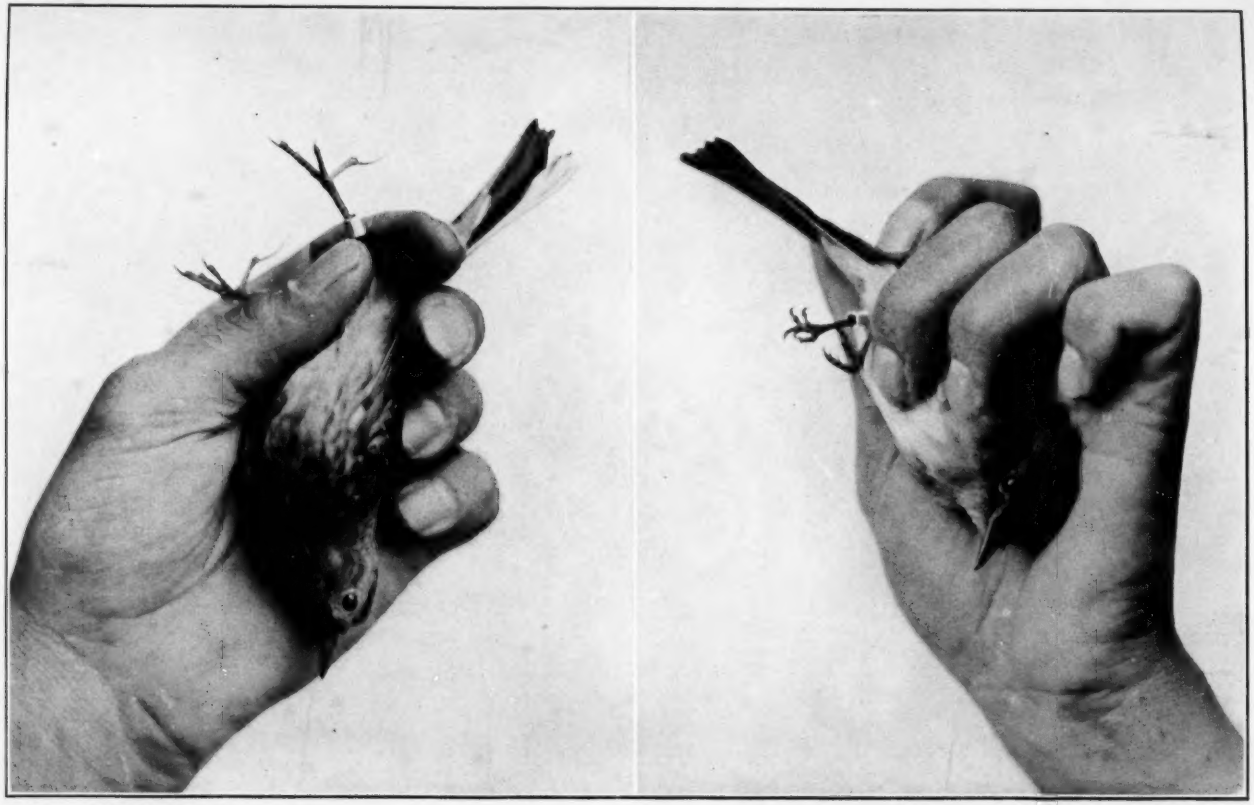
Warblers furnished some of the surprises of the season. Until this year only six Pine Warblers had been banded, one in 1916 and five in 1923. I trapped two on January 24, six more on February 6, and after that I was nearly swamped by new birds and repeats. A total of 72 were banded, and two of Mr. Musselman's five returned, a record of forty per cent. Many of these birds acquired the "trap habit" in severe form, often repeating five or six times a day, and some of them repeated as many as thirty-five times altogether. Early in March the catch of new birds decreased rapidly, and by April apparently only the breeding birds remained. I banded my last new bird April 2, and saw a completed nest on that date.

Mr. Baldwin had averaged over fifty Myrtle Warblers a season for five years, but Mr. Talbot and Mr. Musselman handled only two birds each. A few were seen in January this year, but none were trapped until February 5 when a "return" appeared. This bird, 46895, was banded by Mr. Baldwin February 24, 1921, and repeated six times that year. It was missing in 1922 and 1923, but this year it repeated frequently, the climax being reached February 12 when it was recorded seven times. February 13 it was taken four times, February 14 it was not seen, and on the 15th it was picked up dead, its stomach and bowels empty.

The second Myrtle was also a 1921 return, trapped three times that year and missing in 1922 and 1923. It reported to me on February 14, 1924, and three days later I began to catch new Myrtles. For over a month, until March 23, new birds were banded practically every day, with frequent repeats, but they were never as persistent as the Pine Warblers.

Yellow Palm Warblers were abundant, and Palm Warblers common, during my stay, but did not trap readily, though feeding on the ground all around my traps. Six Yellow Palms, one a return from 1923, and one Palm Warbler, were all the captures.

One of the most interesting birds banded was an American Pipit which strayed into our "four-leaf-clover" dove trap. This is apparently the second banding of this species reported to the Biological Survey.



1. PIPIT. 2. PHOEBE.

UNIV. OF MICH.

Brown Thrashers and Mockingbirds were both common, but quite different in their trapping relations. The Mockers were "trap shy," the few which were banded seldom repeating. 52301, banded February 21, 1921, did not return until February 14, 1924, a gap of three years. 46051 was handled twice in 1923 and twice this year. And one of the four birds I recorded was an accidental capture, flying into the garage one evening and being caught against the window.

In contrast to the six Mockers were the twenty-one Thrashers, five of which were "returns." The interesting story of Thrasher 19247 *alias* 57742, which was eight years old when last handled in 1922, has already been told in the pages of 'The Auk' by Mr. Baldwin and Mr. Talbot. Three five-year-old Thrashers reported this season, 53085, 53092, and 53093, banded respectively on February 19, February 29, and March 10, 1920. Of these the most interesting was 53085, whom I nicknamed "Old Pegleg" because of his missing left foot, amputated some time prior to his first capture. At his second appearance, March 8, 1920, he was accompanied in the trap by the famous 19247 mentioned above. (I say "he" but the sex is unknown.)

In 1921 Pegleg failed to report, but he was recorded twice in 1922 and three times in 1923. I took him on January 20 and two days later he repeated and was taken two miles in an auto to Thomasville to be photographed. At the studio entrance he escaped, disappearing promptly in the shade trees over the main street. Eight days later he was again trapped at his old haunts, and thereafter he reported at frequent intervals, in one of two nearby traps, but never seeming to stray to the others a hundred yards or so from his favorite roosting place in an old wistaria-covered pear tree. If released before his hunger was satisfied, he immediately returned to the traps, so that he was recorded five times on several different dates; he finally became so tame that he took his noonday siesta inside the trap, his head tucked back on his shoulders and he also learned the way out of the sparrow traps when he had finished his nap. He was last trapped on March 9, at a time when new Thrashers were apparently coming in from the south, and we hope that he joined the northward movement and will return to his old haunts next winter.

19247 had usually been trapped in the shrubbery around the main house, and a special effort was made to trap all Thrashers in that region this year. By using Pegleg as a decoy, we finally succeeded in capturing 53092, a bird which had reported every season since its initial appearance in 1920. Another old-timer, 53093, was handled twice in 1920 and 1921, failed to report in 1922 and 1923, but returned March 4, 1924 and repeated several times after that date.

The two other return Thrashers were both 1922 birds. Thrashers usually make a great fuss in the traps, well deserving their name, but Pegleg was very quiet after the first few times.

In 1915, the first year of the banding operations at Thomasville, Mr. Baldwin banded two Carolina Wrens, one of which was picked up dead the following season. No more were caught until this year, when two more were banded, neither of them repeating, however.

Mr. Musselman banded two White-breasted Nuthatches, one of which was attacked by a Shrike while in the trap, as described in his article in 'The Auk.' This was on February 28, 1923, and exactly one year later the same bird suddenly appeared, flew down to the ground beside a pull-string trap, and hopped briskly underneath as if it remembered the date and had an anniversary engagement. Examination showed it to be the southern subspecies.

The little Brown-headed Nuthatches caught my fancy from the first moment I heard them chattering in the great longleaf pines, and it was with much interest that I located a pair excavating a nest-hole in an old pear tree just back of my living quarters. After obtaining a series of pictures of the birds at their nest making, I slipped up one evening and placed a receiving trap over the entrance of the nest, tapped on the bark, and both birds emerged from the unfinished cavity, to become officially known as 90763 and 90764. To the best of my knowledge these are the first Brownheads banded.

Three other nests were located, but twice pickaninnies interfered with the building, and the other nest was inaccessible. One Nuthatch entered the "Brown Creeper" trap which had been placed especially for it above its nest-site, went through the glass

and zinc chute into the receiving cage, but retraced its course and escaped before we reached it to band it.

During my temporary absence in March Mr. Baldwin added a pair of Tufted Titmice to the new species listed at Thomasville, and both of them accommodatingly repeated after my return. They were interesting, pugnacious little chaps, pecking and nipping like miniature Cardinals.

One of Mr. Musselman's most unexpected captures was a female Ruby-crowned Kinglet, 37480, caught on March 9, 1923 and repeating March 20. This bird was my first "return," caught on January 19, the second day my traps were out, making a return record of one hundred per cent for this species. It repeated again on January 20, came twice on January 21, and on January 22 was found inside the trap in desperate conflict with a male Ruby-crown. The new bird was banded and both released, but no later repeats occurred, although I saw a banded Ruby-crown fluttering near the trap a few days later. (All the repeats were in the same trap where the bird was originally banded.)

One Hermit Thrush was captured on January 20, and single birds on February 21, 22, 23, 27, and 28, and March 15 and 16. This was more Hermits than had been banded in all the previous years at the station. The February 23 bird was killed by a Shrike when it repeated two days later.

Robins in the South are usually seen in large flocks, keeping to the woods and swamps, so that I was pleasantly surprised when one came under the pull-string trap when I was watching for Waxwings, on February 27.

Bluebirds were abundant in the stubble fields where some of our Sparrow traps were located, but ignored our bait. April first I found a nest in a fence-post and on the fourth I banded the female bird as she covered the full clutch of four eggs.

The automatic traps of the type of the government sparrow trap were generally very satisfactory, though some birds hopped around them in an aggravating fashion and refused to enter. Pull-string traps furnished a larger variety of species, especially the small all-wire traps in contrast to the larger ones with wooden frames covered with twine netting. The "clover-leaf" traps were made by bending a strip of two-foot poultry netting into

the outline of a clover-leaf, cutting a few strands at the bottom of the bend between leaflets, and roofing over the top with netting. The three-leaf was simpler to make and allowed the birds to be driven more readily into the receiving traps, than the four-leaf. Made of poultry wire without stiffening, it was too flimsy and was easily overturned by marauding animals, but the idea was excellent. It needed careful pegging down all around.

A few fatalities to captured birds occurred. A Cardinal, a Hermit Thrush, two Meadowlarks and a couple of Doves were killed by predatory birds or animals, and a couple of Chippies and a Swamp Sparrow were accidentally killed by rodents trapped at the same time. (Five Cottontail Rabbits, three Cotton Rats, and a Gray Squirrel were captured at different times, attracted by the cracked corn apparently.) One Myrtle Warbler and several Pine Warblers died, perhaps from a too hearty indulgence in cracked corn and similar un-warbler-like diet. One Pine Warbler was observed to have the entire back of his skull exposed, perhaps from poking its head through the wire mesh, but it survived over three weeks in this condition before finally succumbing, seeming strong and well in the interval.

All in all, my visit to Georgia was most interesting and enjoyable, and one long to be remembered. Many of the species handled were birds with which I had long been familiar in their northern breeding range, while others were entire strangers to me. But even the old friends showed a new side when viewed in such different surroundings and under such new conditions. And there is still much for me to learn of the everyday habits of some of our commonest birds.

Winnetaska Lodge, Cohasset, Massachusetts.

NOTES ON THE GENERA OF CACIQUES.

I. The Genus Archiplanus Cabanis.

BY W. DE W. MILLER.

In 'The Birds of North and Middle America' (Pt. II, p. 186) Mr. Ridgway called attention to the decided differences between the more typical members of the Icterid genus *Cacicus* and three aberrant species, *C. albirostris* (type of *Archiplanus* Cabanis), *C. chrysonotus*, and *C. leucoramphus*. Another species allied to this group, which was not seen by Ridgway, is *Agelaius sclateri* DuBois, of which the American Museum has recently received two adult males from eastern Ecuador. But for lack of adequate material there is little doubt that Mr. Ridgway would have formally recognized Cabanis's genus.

After an examination of every species I am able to confirm most of the points mentioned by Ridgway and to add another character. Although certain intermediate species nearly connect the extremes, yet these are on the whole so different that I believe the genus *Archiplanus* should be recognized for the four species named. This arrangement better expresses the interrelationships of the genera of Caciques, for *Archiplanus* approaches *Amblycercus* in all the respects in which it differs from *Cacicus*, and agrees also with *Cassiculus* in the straighter culmen, less expanded basally. *Cacicus*, on the other hand, approaches the larger forms, such as *Zarhynchus* and *Ocyalus*, in all of the features in which it differs from *Archiplanus*.

The four species of *Archiplanus* represent each other geographically, no two living in the same region. In each case their habitat is shared by one or two species of *Cacicus* and usually by an *Amblycercus*, but they do not always occur actually together, for some inhabit different life zones.

The characters separating *Archiplanus* from *Cacicus* are as follows:

Bill smaller, wedge-shaped, the culmen straight or nearly so, usually not distinctly elevated or expanded basally, relatively

broader and more depressed terminally; commissure straight or nearly so; mandible not expanded laterally. Nostrils larger, the postnasal membrane thickened immediately back of nostrils, forming a slight rim which coalesces with the operculum. In *Cacicus* the edge of the operculum is continuous with the prominent lateral border of the frontal shield, and the postnasal membrane reaches the nostril in a narrow groove, well defined from the ramphotheca, and not raised anteriorly. Wing-tip shorter and more rounded, the ninth primary shorter than the third (longer than third in *Cacicus*). Aftershaft of feathers usually better developed; more than half as long as main feather, except in *A. sclateri* (vestigial or absent in *Cacicus*).

In *Cacicus* (except true *C. uropygialis*) the wing-tip is more than one-third as long as the tail (often more than one-half); in *C. uropygialis* one-fourth or slightly less. In *Archiplanus* the wing-tip is considerably less than one-fourth the length of the tail in *C. leucoramphus*, one-fifth to one-seventh in the three other species.

In all four species of *Archiplanus* the tail is longer than in any *Cacicus* excepting true *C. uropygialis*, but the excess in length is very slight in *A. albirostris* in which species and in *A. sclateri* the tail is actually shorter than in *C. uropygialis*.

The plumage in *Archiplanus* is duller and more lax, the postnasal and frontal plumage somewhat longer and less dense. There is a general lengthening of the coronal feathers, forming a fuller crest than in *Cacicus*. What little luster is present, chiefly in *A. albirostris*, is greenish rather than violaceous. There is no exclusive color character, but no species of *Cacicus* is wholly black as in *A. sclateri* nor combines yellow rump with black tail and coverts as in the other species. The bill is distinctly bicolored, instead of being wholly or almost wholly pale or (in *C. flavicrissus*) mostly plumbeous.

I am unable to confirm the supposed difference in the relative length of the toes mentioned by Mr. Ridgway.

Cacicus uropygialis is an intermediate species closely approaching *Archiplanus* in the form of its wing and tail, in its smaller bill, and in the restriction of the bright (red) rump-patch. By the shape of its bill, however, and by the wing and tail of the two allied species or races, *C. pacificus* and *C. microrhynchus*, it is

connected with the more typical members of the genus. The aftershaft in the three forms just mentioned approaches that of *Archiplanus* in its development, but a vestige is present in *C. haemorrhous* and sometimes in *C. cela* and its immediate allies.

Archiplanus sclateri is a rare species which was described by DuBois as an *Agelaius* but has no close affinity with that genus. It is a remarkably distinct species with resemblances both to *Cacicus* and *Amblycercus*. In the widened basal part of the culmen it approaches the former and in the very small aftershaft agrees with the intermediate *C. uropygialis* group. In the uniform black plumage it is like *Amblycercus*, and the short wing-tip is scarcely longer than that of *A. solitarius*.

In size, profile of culmen, and length of tail *A. sclateri* is intermediate between the small *A. albirostris* (in which the culmen is very nearly as perfectly straight as in *Amblycercus holosericeus* and the tail relatively short) and *A. leucoramphus*, which has the most distinctly curved culmen, as well as the longest wing-tip. *A. chrysonotus* which has the longest tail, closely resembles *A. sclateri* in its nearly straight culmen and short wing-tip.

In *A. sclateri* the mandibular rami are longer and the gonys correspondingly shorter than in the other species, particularly *A. albirostris*. In these respects it resembles *Cacicus* and, to a less degree, *Amblycercus*.

C. haemorrhous, the type of *Cacicus*, is the only one of the group in which the crown feathers are not lengthened into a distinct crest, and furthermore it has the most attenuate primaries. The three closely allied species with yellow in the tail (*C. cela*, *C. flavicrissus* and *C. vitellinus*) are the only ones with pointed rectrices (approached by *C. haemorrhous*) and with the tail-coverts like the rump in color. In these respects and in the normal absence of the aftershaft they agree with *Cassiculus*.

II. OTHER GENERA OF CACICINAE.

As is the case in many other groups of birds our classification expresses the interrelationships of the species of Cacicinae very imperfectly. This is as evident from a survey of the other genera as in those just reviewed. Each of the polytypic genera contains species that strongly approach those of allied genera.

Thus *Gymnostinops yuracares* and *Ostinops viridis* are the only species of their respective groups with a broad frontal shield, and they are also strikingly alike in color. Furthermore *O. viridis* approaches *Gymnostinops* in its long crest, long upper tail-coverts and the large amount of yellow in the tail. *O. decumanus* and *O. angustifrons* are intermediate in these respects. The monotype *Clypeicterus* is greatly like *O. viridis* and *G. yuracares* in color and, like them, has the base of the culmen expanded.

Again, the two species of *Amblycercus* are very distinct structurally and, as Mr. Ridgway remarks, may not be truly congeneric. *A. solitarius*, the type of the genus, approaches *Archiplanus* in its open nostrils, faintly convex (instead of perfectly straight or even slightly concave) culmen, well-developed crest, longer wing-tip, and firmer remiges and rectrices, and it also differs from *A. holosericeus* in the form of the primaries.

The gradation in the length of the wing-tip between the longest winged species of *Cacicus* and the shorter winged *Amblycercus*, with the intermediate position and close mutual approach of *Archiplanus* and *Amblycercus solitarius* is shown by the following comparison. In *Cacicus vitellinus* the wing-tip is more than one-third the length of the wing, in the shorter winged species of *Archiplanus* less than one-sixth (in *A. sclateri* less than one-seventh), in *Amblycercus solitarius* one-eighth, and in *A. holosericeus* one-eleventh.

The mutual relationships of the genera of this subfamily may be shown by a comparison of the main groups. The Oropendolas comprise the genera *Gymnostinops*, *Ostinops*, *Zarhynchus*, *Ocyalus* and *Clypeicterus*, the last three monotypic. These are all large or very large Troupials with chestnut in the body plumage, and much yellow in the tail, but with neither yellow nor red on the wings, rump or crissum. The last two regions are chestnut, or in *Ocyalus*, black, and this is also the only species with a terminal black tail-band. The body plumage is often mostly greenish or chestnut with little or no black. A long, sparse crest of a few very narrow feathers is frequently present. In the three monotypic genera and in one species of each of the others, there is a broad frontal shield.

The typical Caciques (*Cassiculus*, *Cacicus* and *Archiplanus*) are small or medium-sized birds, with mainly black body-plumage

and with no olive-green or chestnut. There is yellow in the tail in *Cassiculus* and in some of the species of *Cacicus*, but only in the first does it reach the tip. The rump is yellow or red (except in *A. sclateri*), and there is a yellow patch on the wing-coverts in some species of each genus. The crest, if present, is fuller and consists of much broader feathers than in the Oropendolas.

Cassiculus approaches the latter in the color of the tail and in the form of the crest. *Archiplanus* and, to a less degree, certain species of *Cacicus*, approach the next group in the form of the bill, short wing-tip, (but ninth primary longer than first), longer tail with broader and most obtuse rectrices, well-developed aftershaft, and in the absence of yellow in the tail.

The aberrant Caciques (*Amblycercus*) are of rather small or medium size and wholly black plumage. The wing-tip is short, or very short (ninth primary shorter than first) and the tail is long, with broad, soft, very obtuse rectrices. One species has a crest like *Archiplanus* and closely approaches that genus in the length of the wing-tip.

In *Cassiculus*, *Archiplanus* and *Amblycercus* the culmen is scarcely or not elevated or expanded basally, as it is in nearly all the others.

Thus *Cassiculus* in some respects, and *Cacicus* in others approach the Oropendolas, while *Archiplanus* and especially *Amblycercus* differ from the large forms in nearly every feature.

I would arrange the genera of Cacicinae in the following order which differs somewhat from that of Sharpe's (Hand-List.) *Gymnostinops* seems on the whole to deserve the highest position. *Cassidix* is not a member of this group. It differs in having a well-defined nasal fossa, a neck ruff, ninth primary equalling eighth, shorter tibial plumage, bill wholly black.

Amblycercus	*Ocyalus*
Archiplanus	*Zarhynchus*
Cacicus	*Ostinops*
Cassiculus	*Gymnostinops*
Clypeicterus	

American Museum of Natural History,
New York.

GENERAL NOTES.

Franklin's Gull at Philadelphia—A Correction.—In 'The Auk' for January, 1912, p. 99, I recorded an immature Gull taken at Philadelphia as a Franklin's Gull (*Larus franklini*) mainly on account of the small size of the bill. Dr. Jonathan Dwight, who has studied so carefully all the plumages of these birds, recently examined this specimen and pronounces it an unquestioned Laughing Gull (*L. atricilla*), basing his decision on the definite differences in the juvenal plumages of this and the Franklin's Gull and the fact that the size of the bill in these young birds proves unreliable as a specific character. I hasten to acquiesce in his identification and to cancel the record of Franklin's Gull as a Pennsylvania bird.—Witmer Stone, *Academy of Natural Sciences of Philadelphia.*

Gulls and Terns Feeding on the Seventeen-Year Cicada.—In the summer of 1923 considerable numbers of the seventeen-year cicada (*Tibicina septendecim*) emerged from the ground in Plymouth and Barnstable Counties, Mass., and attacked the trees. On June 26 Mr. Wilfred Wheeler, manager of the Coonamessett Ranch at Hatchville, Falmouth, Barnstable County, notified the Division of Ornithology that "Mackerel Gulls" were coming there and eating seventeen-year cicadas. On July 2 he wrote that on that morning he watched a flock of over 200 Gulls feeding on the cicadas and that they caught the insects in the air, sometimes very high and sometimes quite low near the ground.

Mr. John A. Farley was dispatched to investigate this statement, and the following is extracted from his report: "Laughing Gulls and Common Terns were seen devouring seventeen-year cicadas this year at the outbreaks in Falmouth, Mashpee and Barnstable. Mr. Wilfred Wheeler furnishes an interesting statement. He says the 'peak' of the numbers of the locusts was apparently July 2. On that day Laughing Gulls came close down over the office of the Coonamessett Company, and were seen within two or three rods to catch the imagoes of the cicadas on the wing. The imagoes flew freely from one tree to another, or from one clump of trees to another—quite long distances sometimes. On the special occasion referred to the cicadas were very abundant close by the office, having flown into an oak tree from the nearest woods some distance away. There were a great many of them in the trees, and numbers of them dropped down into the grass beneath. This abundance attracted the Gulls, which were seen to catch the cicadas very close at hand. They were seen also daily in various other places to catch cicadas on the wing. Besides the cicadas that took long flights, the Gulls also caught those that flew only from one tree to another, or from one branch to another. They picked them off deftly from the leaves themselves, and even alighted for a second on the twigs or branches, the better to do this. Mr. Wheeler states that on one occasion

he saw a Gull even alight on the ground to eat these insects, but this was only for a minute. It was where the insects were very numerous, in a little valley where sometimes great numbers of Gulls, attracted by the abundance of their prey, gathered, and flew close to the ground and low growth. According to Mr. Wheeler, there seemed to be intervals between the feeding of the Gulls, when the sated birds flew high up or over Coonamessett Pond. At the time when the cicadas were most numerous the Gulls flew at three levels, close to the grass, at a medium height, and high up."

"Having been informed that great numbers of Gulls and Terns ("Mackerel Gulls") were destroying cicadas at Maravista, Falmouth Heights, I went there on the afternoon of July 4. The cicadas were practically everywhere in the woods and undeveloped lots, but were most abundant in certain spots. The Gulls frequented these places intermittently, coming back to them repeatedly. There were a great many Laughing Gulls; their numbers exceeded those of the Terns. They hovered in a screaming throng over the low growth, close to the foliage and sometimes alighted very briefly thereon. Yet out of the whole number thus seen repeatedly to hover low down, I did not see over two Laughing Gulls with anything in their bills. Probably the reason for this is that they swallowed their catch immediately, and unlike the Terns never came very near me."

"The Common Tern and the Roseate Tern were identified among the 'Mackerel Gulls.' The Terns were quite fearless and dashed into the low growth within a few yards of me, and the objects taken in their bills were the size and shape of the seventeen-year cicada; also they were darting down into bushes which were much infested with cicadas. The Terns flew off with their prey plainly held in the bill. They went in the same direction always, and the inference was that they were carrying food to their young on sand-bars or islets in the tidal arm of salt water not far away. The Terns were seen also to carry small fish (?) in their bills in the same direction."

"On July 5 on a sand-bar frequented by Terns and Gulls some distance away from the infested spots, I found many remains of cicadas, heads and wings attached left intact, but everything else was gone."

"Mr. Henry Peters, tree warden of Mashpee, told me that the same scenes had been witnessed in Mashpee. Cicadas seemed to be most abundant in the swales and little valleys, and in these places birds gathered very abundantly."

Mr. William F. Jenkins, of West Barnstable, reported that Gulls were doing similar work in Santuit, and another report came in to the effect that Gulls were taking the cicadas on the wing at Seven-mile Pond. Mr. Wilfred Wheeler reported that Robins, Bluebirds and Chipping Sparrows were eating the insects, and Mr. Farley saw a Robin in the act.

Mr. R. H. Allen, Director of the Division of Plant Pest Control of the Massachusetts Department of Agriculture, who was at Coonamessett Ranch, Hatchville, for one hour on the afternoon of July 9, asserts that the Gulls were hovering over the infested trees in the swale or little valley which

has been mentioned already. He found on the ground there, heads of cicadas, with wings attached, which apparently were the inedible parts of the insect which the Gulls had caught.

In a letter received on August 24 from Mr. Allan Keniston, superintendent of the Heath Hen Reservation on Martha's Vineyard, he asserted that he was on Muskeget Island at the time of the outbreak of the seventeen-year cicada on Cape Cod, and that the Laughing Gulls there were feeding their young on that insect. On further inquiry he said that when the young were frightened, they threw up "mashed cicadas." He reported that he saw about a dozen young regurgitate the remains of these insects, and around the spots where the young were congregated numerous parts of the cicadas, as wings, etc. were scattered on the ground.

Correspondence with the United States Department of Agriculture, Bureau of Entomology, elicited from Dr. J. A. Hyslop, entomologist in charge, the fact that in Barnstable County (Cape Cod) the seventeen-year cicada appeared this year in Sandwich, Mashpee, Falmouth, Barnstable and Yarmouth, with a few other records from the border line between the townships of Truro and Wellfleet. The most intense broods were found along the shore of Cape Cod from Falmouth to Yarmouth, with heavy broods on the east side of Buzzards Bay in Bourne and Sandwich. So far as can be learned there was no outbreak of the seventeen-year cicada south of Cape Cod on Nantucket, Martha's Vineyard or any of the Elizabeth Islands. Therefore if Laughing Gulls at Muskeget fed their young on these insects, they must have carried the food at least twenty-one miles from the Cape Cod region, for it is about that distance from Muskeget Island to the nearest colony. They must have carried quantities of the insects in their gullets and then regurgitated them into the mouths of the young. Laughing Gulls and the Common Terns are well known to feed largely on insects at certain times of the year.—EDWARD HOWE FORBUSH, *Boston, Mass.*

First Ontario Record for Fulmarus g. glacialis.—To add a new species to your own local list is always a very pleasant experience but to be able to make an addition to a provincial or state list is something that the average observer takes the greatest delight in doing. Consequently it gives me the greatest pleasure to be able to add the Fulmar (*Fulmarus g. glacialis*) to the avi-fauna of Ontario. Not only is this the first record for the province but it is also probably the only inland record for all of North America. The bird, a single individual, was taken on May 3, 1924, near Arnprior at the mouth of the Madawaska River where it empties into Lac des Chats an expansion of the Ottawa. As is usually the case with the species it was remarkably tame and its capture was easily effected by means of an ordinary fishing line with an enticing minnow as bait. Due to the fact that the bird had probably been feeding in fresh water for some time the musky odor, characteristic of the family, was almost entirely absent and there was no sign of the oil usually emitted by the species when captured. Arnprior is about forty miles north-west of the city of Ottawa and

about four hundred miles from the nearest salt water. The specimen, which was in the best of condition, is now in the Canadian Geological Survey collection, Victoria Memorial Museum, Ottawa and was entered under Accession No. 2124.—A. L. Gormley, *Arnprior, Ont., Canada.*

Status of the Black and Mottled Ducks in Colorado.—Dr. W. H. Bergtold ('Auk', XLI, p. 338) reports a Black Duck (*Anas rubripes*), from Longmont, Colorado, taken December 9, 1923. Another example, taken at Windsor, Colorado, December 9, 1921, has recently been donated to the University of Colorado Museum by Mr. Geo. E. Osterhout. It was labelled *Anas fulvigula maculosa*, but I decided it was *rubripes* and Dr. Bergtold has confirmed that conclusion. This revives interest in the old question of the Black and Mottled Ducks in Colorado.

In his 1873 list of Colorado birds Mr. Ridgway credited *rubripes* to Colorado, but not *maculosa*. The latest edition of the A. O. U. 'Check-List' does the same. Cooke ('Birds of Colorado,' 1897, p. 53) records one *rubripes* from Loveland, but evidently did not see the specimen. In the Second Appendix, 1900, he changed it to *maculosa*, saying "although no specimens of this Duck [*maculosa*] taken in Colorado has been examined by the writer, yet there can be no doubt that the three specimens reported [as *rubripes*] really belong to this subspecies [*maculosa*]." Felger ('Auk,' XXVI, 1909, p. 280) accepted Cooke's last guess, which was evidently based purely upon geographic grounds, and records two others as *maculosa*, one from Longmont, 1895, the other from Loveland, 1904. The same writer ('Auk,' XXVII, 1910, pp. 451–452) discusses the subject more fully and records another example, a mounted male, in the Colorado Museum of Natural History, taken by W. N. W. Blayney at Loveland, Colorado, 1907. He also says that his 1904 Loveland specimen, a female, had since been identified as *rubripes* by Dr. Harry C. Oberholser. He thereupon compared his female specimen with the Blayney male in the Colorado Museum of Natural History and concluded that the latter was also *rubripes*. However, Hersey ('Auk,' XXVIII, 1911, p. 490) declares that what is evidently the same Blayney specimen has been identified as *maculosa* by both Oberholser and Cooke, the latter declaring it to be the first sure record of *maculosa* for Colorado. Felger ('Univ. Colo. Studies,' VII, 1910, p. 133) reports "black mallards" in White River Valley, but they were not seen by him and no attempt was made to give specific identification. Sclater ('A History of the Birds of Colorado,' 1912, p. 38) says he has examined the Blayney specimen and agrees with Cooke in calling it *maculosa*.

From this review it seems quite probable that both forms occur rarely in Colorado. While it is impossible now to check up all former records, it is quite possible to get more records of one or both forms by watching the bags of the many hunters.—Junius Henderson, *Boulder, Colo.*

Blue-winged Teal Breeding on Long Island—Supplement.—A noted ornithologist has written to me in friendly criticism of my note in 'The Auk' on the Blue-winged Teal breeding on Long Island. As these

birds were killed by a poacher, he suggests that I publish a note explaining this matter. I am giving herewith a copy of my letter to him.

"I appreciate your feeling in regard the killing of the Blue-winged Teals. It was a great disappointment to me that these birds were destroyed, as they were not killed by me. They were shot by a clam-digger who had run up the creek in his boat. It was a regret that I could not punish him by law. As it was we came to blows over the dead Teals and I took the birds from him by force. This party was a stranger and has never returned here, for very good reason.

"I had been studying these Teals in the marsh for several weeks previous to that date and they were very tame. I have never in my life killed a Duck after the shooting season has closed and never shoot them for sport in winter. As a total I have not killed over one dozen Ducks in the past twenty years.

"In my note to 'The Auk' I mentioned only the breeding record, feeling that general interest ended there."

The above record is evidence that I have not severely depleted the ranks of our wild-fowl.—Roy Latham, *Orient, L. I.*

Ring-necked Duck in Delaware County, Pennsylvania.—On March 30, 1924 I saw a Ring-necked Duck (*Marila collaris*) on a small pond about 300 x 150 feet in Griffiths Park, Lansdowne, Pa. I watched it for half an hour at a distance of twenty feet and farther away through glasses. It was a full plumaged male and the light band over the bill and the definite, though not conspicuous, collar, as well as the dusky or dirty white sides as distinct from the white of the sides next to the black breast were clearly seen. He would dive and remain under water for some time and once raised up and flapped his wings. The species is decidedly uncommon here and the observation seems worthy of record.—Asa P. Way, *Lansdowne, Pa.*

Snow Geese at Boonton, N. J.—On April 6, 1924, Mr. Frank E. Watson and I observed a flock of 37 Snow Geese—presumably the Greater (*Chen hyperborea nivalis*)—over the Jersey City Reservoir, at Boonton, Morris County, New Jersey. The flock evidently had just arisen from the water and passed nearly over our heads, well within gunshot, thus giving us an excellent view. They then headed directly north.

This reservoir, approximately three miles long and a mile wide, during migrations attracts large numbers of Anatidae, 17 species having been observed there by the writer.—T. Donald Carter, *American Museum of Natural History.*

Least Bittern in the Orient Region, Long Island.—The Least Bittern (*Ixobrychus exilis*) was first located in our region at East Marion by Mrs. Harold P. French during the winter of 1921. This was by the discovery of an old nest. The following summer, 1922, the bird was observed there by Mrs. French. In June of the same year the nest with eggs was

found there by the writer. There was evidently but one pair in the restricted flag area.

In 1923 the writer found another pair in an extensive cat-tail swamp near Arshamomaque, where a nest containing eggs was found in June.—Roy Latham, *Orient, L. I.*

Snowy Egret (Egretta candidissima) at Newport, R. I.—With the snow storm of April 2, 1924 came a full plumaged Snowy Egret evidently swept up the coast by the storm from some point far to the south. The bird was picked up dead on the piazza of Mr. Charles A. Hall of Newport and presented to the writer who has had it mounted and will place it on exhibition in the Children's Museum of Newport.

The plumes on the head, breast and back are perfect, the toe claws are black, the feet light orange and the legs black or extremely dark green. Measurements: length 24 inches, wings extended 38, wing 9.50, tail 4, tarsus 3.75, middle toe 2.75, bill 3. This is the first authentic instance of the occurrence of the species in Rhode Island so far as I can ascertain.—A. O'D. Taylor, *38 Powel Ave., Newport, R. I.*

The Stilt Sandpiper (Micropalama himantopus) in South Carolina.—In view of the fact that the Stilt Sandpiper has not been taken in South Carolina since the days of Dr. Bachman, the following record is worthy of publication.

On August 22, 1912, the writer, in company with Mr. B. R. Chamberlain and Mr. C. P. Webber, the latter of Georgetown, S. C., was shooting Yellow-legs (*Totanus flavipes*) on Pawley's Island, a long, narrow coastal island a few miles from Georgetown. During the shooting Mr. Webber killed a Stilt Sandpiper. This bird, a female in winter plumage, was shot from a flock of Yellow-legs, while flying low over the salt-water myrtles (*Baccharis halimifolia*) near the back beach of the island, and within two hundred yards of the nearest house.

Mr. Arthur T. Wayne, in his 'Birds of South Carolina,' says of this species: "This rare species is included on the authority of Dr. Bachman, who appears to have taken many specimens near Charleston.....During the past twenty-five years I have devoted much time and study to the Limicolae, but as yet I have not taken a specimen of this rare bird, although I believe I saw a small flock on August 1, 1901." Since Mr. Wayne wrote in 1910, up to the present time, no specimens of this bird have been seen or taken, with the sole exception of the specimen recorded above. This specimen has been donated to the Charleston Museum (No. 7171) and recorded in the 'Charleston Museum Bulletin', Vol. IX, 52, 1913.—E. B. Chamberlain, *Charleston Museum, Charleston, S. C.*

An Oyster-catcher in Brunswick County, Virginia.—On January 13, 1924 a farmer living four miles north of Lawrenceville, Va., told me of the shooting of a strange bird by a negro laborer employed on his farm.

My friend's description suited the Oyster-catcher exactly, and as he said the negro had saved the head and wings of the bird, I at once went to his place and found that these remnants had actually belonged to *Hæmatopus palliatus*.

The bird was shot in an open field on January 3, 1924. The location is on top of the divide between the Notaway and Meherrin rivers, and miles from any stream too large to step across. It is 100 miles west of Norfolk, and about 135 miles from the ocean. The elevation is 380 feet.—JOHN B. LEWIS, *Lawrenceville, Brunswick County, Va.*

Viability of Seeds passing through the Alimentary Canals of Pigeons.—There is considerable literature on the food of birds, which has special reference in most cases to the economic aspects of the food preferences of particular species of birds. The seed-eating birds are known to carry seeds on their feet, feathers and in their beaks. Seeds carried in such ways may fall on places suitable for germination. Proctor (1896) observed that Thrushes and Warblers regurgitated seeds from the fruits they had eaten. The experiments described in the present paper were undertaken in attempting to determine if there is a possibility that certain seeds may pass through the alimentary canal of a bird and still retain their viability. It is understood, of course, that all birds might not give the same results as Pigeons.

Six Pigeons (*Columba livia* L.) were kept for the experiments and when not in use were allowed freedom of movement in a large, out door wire cage (6 feet high, 10 feet long, 4 feet wide). When not under experimentation, the birds were fed a mixture of corn, wheat and millet, and were given plenty of water, grit and salt.

The experimental cages, each of which contained one bird, were made of wire and wood and were 12 inches high, 18 inches long, and 10 inches wide. While in these cages, the birds were fed only cracked corn and the seeds to be tested. J. M. Bartlett (1911)[1] states that corn shows a higher digestibility in birds than any other grain. Since this is the case, digested food was easily distinguished from the test seeds.

The floor of the experimental cage was covered with heavy brown paper to catch the excreta. In all the tests, the birds were not fed the day before the trial, so that their crops were relatively empty when the test seeds were given. The fact that the digested and undigested portions of the food are excreted together makes a serious obstacle in performing experiments with birds and greatly increases the amount of necessary analytical work. This probably, in part, accounts for the small amount of work that has been heretofore undertaken in this line.

The seeds used in the experiments were apple, grape, strawberry, and cherry, as representative of types possessing relatively resistant seed coats. Only one type of seed was used at a time and the seeds were forced into the

[1]Ann. Rept. Maine Exper. Station Bull., 26, pp. 317–336.

crop by means of a glass rod. The birds were then placed in the experimental cages and left for sixty hours. Kaupp and Ivey (1923)[1] studied the length of time required for food to pass the entire digestive tract in fowls and found that eleven hours were sufficient. The pigeons were therefore kept in the experimental cages long enough to assure the passage of digested seeds. The excreta were examined carefully by teasing under a binocular microscope.

Of the forty apple seeds fed to the pigeons, two seeds were regurgitated and all the rest were thoroughly digested. Brown flakes of seed coats were found here and there in the excreta.

Similar results were experienced in the trials with strawberry seeds. No trace could be found of any portion of the seeds.

Grape seeds, however, gave slightly different results. Of the forty seeds, four retained their shape, but were soft and flaky. The other seeds appeared in the excreta in pieces of various sizes, all soft and flaky. Although the seeds appeared incapable of germination, they were planted, but none sprouted.

Five cherry seeds were fed to each of two birds and all but one were regurgitated within a few hours and the other was regurgitated a day later. Birds that eat a number of large seeded fruits probably regurgitate most of the seeds, as Proctor (1896) observed. The above result suggested that if a smaller number of seeds was fed that they might be retained rather than regurgitated. One cherry seed was fed to one Pigeon and was retained and located in the gizzard after three weeks had elapsed. The seed was markedly smaller in size and showed that it had been used in the gizzard as grit, gradually wearing and dissolving away, until the seed became small enough to pass out with the feces. M. R. Curtis (1914)[2] found the same result in observing the ability of chickens to digest pieces of aluminum.

It would appear, then, that the combination of the mechanical grinding of the gizzard and the action of the digestive juices changed the seeds to such an extent that they would not germinate.

Although some birds may be able to pass seeds through the digestive tract without rendering them incapable of germination, the writer's experiments indicate that the Pigeon could not (judged by the four seeds tested) be included in the list of such birds. The voided seeds were crushed and digested beyond power of germination. The Pigeon, therefore, cannot feature in reforestation resulting from the distribution of seeds that have been voided in excreta and there may be some doubt as to whether other birds are able to do so.—Mary Sayle, *University of Wisconsin, Madison, Wisc.*

Black Vulture (Coragyps urubu) nesting in Maryland.—April 28 to May 6, 1921, Mr. Herbert W. Brandt, Cleveland, Ohio, and the writer collected oological material in St. Mary's County, Maryland. Our work

[1] Jour. Agric. Res. 23, pp. 721–725.
[2] Ann. Rept. Maine Agric. Exper. Sta. Bull., 29, pp. 314–318.

was mostly along the shore of Chesapeake Bay from Cedar Point to Point Lookout and up the Potomac River to Piney Point.

This locality is very low and the greatest height is not over twenty feet above sea level. The greater part is under cultivation, with many large tracts of the virgin timber, mostly large yellow pines and quite a few white oaks. On April 29, while collecting sets of the Fish Hawk (*Pandion haliaetus carolinensis*), we saw a great many Vultures roosting in the dead chestnut trees on the east side of Harpers Creek. Thinking them at first to be the Turkey Vulture, we did not pay much attention to them, but as we came close by they flew around and we immediately recognized them as Black Vultures (*Coragyps urubu*). Having had considerable experience with this species in the coastal region of southern Texas, Carolinas, and Florida we were absolutely certain of our bird.

The same time in 1922 Mr. A. Ernest Sikken, Hyattsville, Maryland, and I collected twenty miles farther south and we succeeded in finding a very handsome set of two eggs of this species. The set was taken April 29, on Mr. W. H. Ridgell's Farm, Deep Creek, St. Mary's County, Maryland. The eggs are typical and handsomely marked with chocolate to reddish brown of different tints with a wreath of underlying markings of lilac and lavender spots, while one egg is evenly spotted over the entire surface. Incubation was fully one-half completed. The nest was in a very large white oak stump, in a cavity about two feet below the level of the ground.

1923 we again collected on this tract and found the birds had occupied the old nest. This set was heavily marked and both eggs well matched and was fresh on May 3, 1923.

This stump had been used for many seasons by a pair of Turkey Vultures, but they shifted a hundred feet back in the woods under a large fallen tree.

The Black Vulture nests quite plentiful in this county, as I have seen it at various places. While after *Haliaetus leucocephalus* in February 1924 at Aquia, Stafford County, Virginia, I saw nine Black Vultures flying towards the Potomac River just at dark. This locality is only forty miles from Washington, D. C.—Edward J. Court, *Washington, D. C.*

A Set of Three Eggs of the Turkey Vulture.—May 4, 1924, I found a set of three eggs of the Turkey Vulture (*Cathartes aura septentrionalis*) in Prince George County, Maryland. The eggs were resting on a well matted carpet of dry leaves on the ground under an overturned bifurcated root stump of a large dead chestnut tree, the stump being densely covered and draped with honeysuckle vines. The entrance to the nest was on the northwest side, facing a heavily pine wooded knoll. Leading to the entrance was a well defined path about five inches wide obviously made by the Vultures themselves, extending for some four or five feet through the mass of honeysuckle vines covering the ground for that distance in front of the entrance. Just inside and crosswise to the entrance lay a primary feather of one of the Vultures. The area about the nest for something like half an acre was overgrown with honeysuckle vines running over the ground and

shrubbery and up the few scattered saplings. The parent bird had emerged two or three feet from the nest and was about to spring into the air before I realized that its nest was near. The eggs were uniformly slightly incubated and are well up to the normal size of eggs of this bird, measuring in inches 2.89 x 1.90, 2.82 x 1.86, and 2.57 x 1.90. The two larger eggs are remarkably alike in arrangement of their pigmentation, which is quite evenly dispersed over their surfaces. On the smaller egg the splotches are consolidated in a pronounced wreath at the larger end. I am informed that the egg collection in the United States National Museum does not contain a set of three eggs of this species.—ROBERT W. WILLIAMS, *Washington, D. C.*

The Mississippi Kite (Ictinia mississippiensis) at Cape May, N. J. —Continued intensive study of the bird life of a favorably situated locality will result in the recording of an astonishing number of rare species or better, perhaps, species which have strayed from their proper habitat. The discoveries of Arthur T. Wayne at Mount Pleasant, S. C., constitute a case in point.

Beginning with the season of 1920 the writer with the aid of the members of the Delaware Valley Ornithological Club has made an intensive study of the avifauna of Cape May, N. J., a region pretty well known, in a general way, from previous observations but never studied carefully. The results have been most nteresting and such species as the Gray and Arkansas Kingbirds, Louisiana Heron, Wood Ibis, Yellow-throated Warbler, etc., have been added to the list of Cape May birds. The location, at the southern extremity of a narrow peninsula with the Atlantic Ocean on one side and Delaware Bay on the other, is probably on the path of two lines of flight for migrating birds and this as well as its latitude, about opposite Washington, D C., doubtless make it an excellent spot for the occurrence of straggling individuals of southern species

That the possibilities of the locality are not exhausted was evidenced on May 30, 1924, when members of the D. V. O. C., on their annual field trip to the region, observed a full plumaged adult Mississippi Kite. The writer and Mr. Julian K. Potter caught sight of the bird simultaneously as it sailed over an orchard about two miles north of Cape May City and close to the Bay shore. We at once realized that it was something with which we were entirely unfamiliar. At a distance, when we could see only the edge of the wings, its action, as it faced the strong north-west wind that had been blowing all day, recalled the efforts of a Laughing Gull under similar circumstances but as it approached us we saw immediately that we had to do with a bird of prey and one of different plumage from any with which we were familiar. The peculiar habit of tilting up so that the entire upper surface was brought into view attracted our attention and brought into prominence the jet black square cut tail which stood out in contrast to the rest of the plumage. The pale gray head, which appeared almost white as the sunlight struck it, was also conspicuous and the bicolored wings, the anterior portion

of which was dark slate and the posterior border (exposed secondaries) pale gray, in strong contrast.

For half an hour we watched the bird's remarkable aërial performance and in all this time while rising and falling through the air always facing the wind it did not pass beyond the limits of a few acres of open farm land. It drew in its wings slightly or extended them sometimes simultaneously, sometimes only one, in its efforts to "trim sails" and maintain its balance in the gale and now and then the black fan-shaped tail was thrown over to one side or the other for the same purpose. While it humped its shoulders in regulating its wings and occasionally gave very slight strokes of about a quarter of the full arc it never, while we watched it, gave a full wing beat. Eventually tilting and sailing and turning till its tail was nearly vertical, it disappeared over a piece of woodland to the north. When directly over us at an elevation of some sixty feet we could see every detail of its markings through the binoculars and the under parts were then observed to be plain light gray.

Unfortunately there was no means at hand of collecting the specimen but the fact that we had so many observers—twelve besides the writer, including such reliable students of the local fauna as J. K. Potter, W. L. Baily, J. A. Gillespie, etc., together with such a uninterrupted opportunity for observation and such an easily identifiable subject, induce us to publish the record, even though it be an addition to the fauna of the State and ought, according to Mr. Ludlow Griscom's excellent rules of procedure, to be fortified by a specimen.—WITMER STONE, *Academy of Natural Sciences of Philadelphia.*

Another Goshawk's Nest in Massachusetts.—On April 18, 1924, I took three eggs and nest of the Goshawk (*A. atricapillus*) in Petersham, Worcester Co., Massachusetts. This 1924 nest was in the same general locality where the nest was found in April of last year, as I recorded in 'The Auk' for July, 1923. As last year, the nest was of enormous size, and was new throughout, without sign of either leaves or woods dirt. It was plentifully "feathered." The nest was beautifully made, largely of long green hemlock and pine twigs, and had a very shallow interior, with coniferous bark floor. It was placed on horizontal branches and against the tree trunk. It was 40 ft. from the ground (two-thirds the height of the tree) in a white pine a foot and a half in diameter. The three large pale blue eggs were considerably incubated.

This is the second note of the nesting of the Goshawk in Massachusetts, the first being my record of last year.—J. A. FARLEY, *52 Cedar St., Malden, Mass.*

Great Horned Owl at Englewood, New Jersey.—A bird of this species was seen on March 28, 1924. He was being pestered by Crows, when suddenly he lit upon a branch not far above our heads. Upon seeing us, he lifted up his horns. A few of my friends were with me at the time. This

species has long been extirpated in the Englewood region. Two Barred Owls were also seen on this trip. Like the Great Horned Owl, they too were being pestered by Crows. We found the pellets of these Owls, which we brought to Mr. Miller, of the American Museum of Natural History.—Victor Rosen, *New York City.*

Nesting Habits of the Long-eared Owl.—The subdued but persistent cawing of Crows with which were intermingled occasionally the most remarkable sounds brought me to the foot of a pine, which contained an old Crow's nest. While climbing up I heard cries and groans below, and looking down perceived a Long-eared Owl flopping around on the ground and uttering indescribable noises as it looked distressedly up at me. Continuing up in eager anticipation I found the nest contained four roundish, white eggs, the size of a bantam's, and two newly hatched young owls, delicately beautiful in their fine white down. A large mouse lay on the edge of the nest ready to be fed to the young in small bits as their first taste of food.

The old bird remained on the ground until I had nearly descended, bemoaning and carrying on to the best of her ability. On my subsequent visits to the nest this demonstration was frequently repeated. Sometimes one of the birds would strike a limb and flop down to the ground as if injured, uttering at the same time its wild and curious cries. At other times they cried and hooted from branches in the trees. One—the cries given when the birds were greatly stirred—was a high pitched "quick" repeated several times, the notes drawn out and running together, and turning into a scream, when the birds became very excited. Another call, low pitched, suggested "whock". A single low hoot was also uttered. Early in the spring I had heard Owls hooting in the vicinity—a single low hoot several times repeated—when I passed in the evenings, but for a month or so I had not heard them, and the Owls had evidently quieted down after laying.

One of the birds was always on hand to guard the nest. The malicious persistency with which the Crows tormented them drew one's sympathy. Occasionally both adults were present and took part in the demonstration above mentioned. They often swooped by my head, never striking me, however, for I was always ready for them. Usually only one bird was observed, the other probably being away hunting, as this species often hunts during the daytime, and they would find it necessary to supply the demands of the family. No doubt both Owls hunted at night.

From my notes:

May 14. Found nest of Long-eared Owls, twenty-five feet up in pine. Four eggs, two newly hatched young. Large mouse on hand.

May 15. Third egg hatched, fourth hatching. Young make a low peeping. Two deer mice.

May 17. Fourth egg hatched, fifth hatching. Oldest young—age about six days—with eyes open. No food.

May 19. Fifth egg hatched, sixth rolled to one side and spoiled. Oldest young snapped beak aggressively. No food.

May 22. Oldest about eleven days old, primary quills not yet started to open, but some of body feathers with small tassels. Two mice. No traces were found of any food having been brought to the nest except mice, good proof of the value of this species. No food was found at the nest after this day, and as the young grew older their parents probably had a difficult task to supply enough for the family.

From the above it seems that the eggs are laid on alternate days, and that incubation begins with the laying of the first egg, which is what would be expected because of the cold weather likely to prevail early in April. The difference between the ages of the oldest and youngest of the young owls was thus nine days, a difference fully evident in their development. The oldest left the nest when about four weeks old, but the younger ones prompted by the example set them began crawling around in the branches long before they could fly, and they also imitated the oldest in the defensive spreading of the wings, a habit which the latter acquired when two weeks old.—F. N. Whitman, *Ithaca, N. Y.*

Northern Pileated Woodpecker in Dutchess County, N. Y.—One day in January, 1924, a farmer informed me of seeing a large Woodpecker, the size of a Crow, and with a red crest. About two weeks later when in the woods I saw the bird, which proved to be a Pileated Woodpecker. He was about 60 feet above the ground on a dead tree. About a week later I again saw the bird in the same place. The date of his first appearance was January 12, 1924. I believe this bird strayed over from the Berkshires of Massachusetts, which are not far away.—Edward D. W. Spingarn, *Amenia, N. Y.*

Red-headed Woodpecker in Lincoln, Mass.—In January of this year a friend reported to me that there was a strange bird with a red head staying around Farrar Road. I went over and saw the bird, a Red-headed Woodpecker (*Melanerpes erythrocephalus*), on a very large dead oak tree. It has spent a good deal of its time on that tree ever since, and has been seen by various ornithologists and also members of the Brookline Bird Club. One day I saw it being closely chased by a Crow, but it finally found refuge in the oak tree. It was still in that vicinity April 28, 1924.—Mrs. Alice B. Harrington, *Boston, Mass.*

Nest and Young of Yellow-bellied Flycatcher.—On July 15, 1923, we started from an overturned spruce on the "Long Trail" near Kirby Mountain, Addison County, Vermont, a small bird which gave a flash of yellow as it flew and which on closer inspection proved to be a Yellow-bellied Flycatcher. The tree in question had been blown over by a heavy wind and the base had ripped up a mass of roots, turf, stones and leaves which formed a virtual wall about six feet high by eight feet long. A short search along this structure disclosed the nest in the mass of roots and earth torn up by the stump, about three feet from the ground and an arm's length from the trail. It was so located as to be well protected on every side and

admirably sheltered from the rain which had just begun. The three young which were a couple of days old, to judge from their practically naked yellow-orange skins spotted with black patches of down, fitted snugly in their cup of roots about two inches across, lined with ferns and grasses. The parent bird was very nervous, calling, "Pee-weep, Pee-weep," or "Ter-ee, Ter-ee," as we variously expressed it, in a plaintive manner, although not sufficiently frantic to attract attention. Although too wild to feed the young in our presence, it flew from perch to perch in a fifty foot radius about the nest and us, wagging its tail slightly, at times pausing a moment to snatch an insect, but never ceasing to call as indicated above. Its mate sputtered also giving the "Ter-ee" call with occasional peculiar inflections, one of which was a many syllabled winnowy note. The altitude at this point was about 2900 feet above sea level and the tree was in a fine patch of spruce forest not far from a spot where we found a Junco's nest with two young, lodged in an exactly similar situation in an old windfall.—WARREN F. EATON, *Weston, Mass.*, HASKELL B. CERRY, *Boston, Mass.*

Clarke's Nutcracker in Interior Alaska.—As Clarke's Nutcracker (*Nucifraga columbiana*) is rare in Alaska, a few records from the interior may be of interest. It has been taken on the Kowak River, also at Nushagak on Bristol Bay, at Sitka, and has been observed near Eagle, but I find no other published records.

In the fall of 1919 one of these birds was observed frequently at Takotna, in the Kuskokwim Region. It became very tame and confiding, came to various cabins for food, and was considered a pet. On October 1, 1919, the bird was shot and some time later the dried body was given to Mr. A. H. Twitchell, who kept it and turned it over to me in March, 1922.

Another Nutcracker was shot by Mr. Joe Blanchell, who keeps a roadhouse near Farewell Mountain, on the upper waters of the South Fork of the Kuskokwim River. One day in September, 1921, he saw a strange bird alight on the stove-pipe chimney of his cabin and shot it. He left it hanging by the feet in a steel trap on a cabin wall until my arrival at that point the following February. Enough remained of the bird for certain identification.

The third record for the interior was obtained in the Fairbanks Region. Mr. S. Wilson, who has a roadhouse on Chatanika River, 26 miles above the town of Chatanika, secured a male there in September, 1922. He sent the bird to Fairbanks, where it was kept in cold storage until my return from a lengthy trip the next April. The skin was prepared and placed in the Biological Survey Collection.—O. J. MURIE, *U. S. Biological Survey, Washington, D. C.*

Further Increase in Grackles at Portland, Maine.—Several years ago attention was called in 'The Auk'[1] to a great increase in the number of Grackles (*Quiscalus quiscula æneus*) to be found at Portland, Maine. Since

[1]Vol. XXXIV, p. 210.

that time there has been further increase, and the birds formed a great multitude during the late summer and the early autumn of 1923. Even the busiest streets of the city were visited by them at times. On September 10 the writer noted a small flock on the roof of a building at the corner of Congress and Park streets, from which several birds descended to the sidewalk to pick up fragments of food fallen from some person's lunch-basket. I saw others elsewhere in the heart of the city at other times. When I left Portland for the season, on October 10, hundreds of Grackles were still frequenting the suburbs.—NATHAN CLIFFORD BROWN, *Portland, Maine.*

Redpoll (Acanthis linaria) in Alabama.—Mr. Arthur H. Howell in his 'Birds of Alabama,' just published by the State Department of Game and Fisheries, gives (on page 223) but two records of the occurrence of the Redpoll within the boundaries of this State. Both of these were made in extreme northern Alabama—Stevenson and Florence—and the validity of the first is questioned by Mr. Howell because September, the date of the reported capture, seems too early for such a boreal species to appear so far south. Therefore the following recent record, which I publish through the courtesy of Mr. Lewis S. Golsan, of Prattville, is of especial interest.

On February 13, 1924, Mr. Golsan was driving in a buggy along the Prattville-Booth road when, about three and a half miles west of Prattville, he saw a Redpoll in a roadside hedge. The bird, described by Mr. Golsan as a "fine male", was in company with three or four Pine Siskins and might have been passed unnoticed but for its bright red cap. Mr. Golsan stopped his horse and inspected the bird at a distance of about fifteen feet, noting plainly the small size, sharply pointed bill, and reddish breast-patch, as well as the red crown-cap. As Mr. Golsan has been a life-long student of birds and is thoroughly familiar with the Purple Finch, the only species that, in this locality, could possibly be confused with the Redpoll, I unhesitatingly vouch for the accuracy of his diagnosis.

That northern birds should appear farther south than usual this year should not occasion surprise when it is remembered that the closing months of the past winter were extremely severe.—ERNEST G. HOLT, *312 Bell Building, Montgomery, Ala.*

Breeding of MacGillivray's Seaside Sparrow in South Carolina.—On the afternoon of May 16, 1924, the writer had the pleasure of discovering the first nest and eggs of MacGillivray's Seaside Sparrow (*Passerherbulus maritimus macgillivraii*) ever found in South Carolina. The details of this discovery may be of interest.

On May 13, together with Mr. E. B. Chamberlain, I left Charleston for a collecting trip for the Charleston Museum, with which we are both connected. Our destination was about thirty-six miles south of this city, and our route lay over the Charleston-Savannah Highway. About fifteen miles out from Charleston, this highway crosses a wide tract of salt marsh, and the causeway just completed over this waste was the situation that

lead to the finding of the nests three days later. On our way down the country, on the 13th, while crossing this causeway, a bird flew from the marsh, and lit on the embankment that lines the concrete road. We recognized it as a MacGillivray's Sparrow, and as the sight of this bird at this time of year is unusual, we at once stopped, and watched it for several minutes with binoculars, at a distance of about thirty or forty feet. Several others were seen flying about the marshes, and of course we wondered if they could be breeding.

It has been long suspected that this form does breed on the South Carolina coast, but no proof had ever been brought forward. We determined to try to establish the fact that they do nest here, and so on our return from the collecting trip, we decided to put in a day on the marshes. On May 16, we left early in the morning, and went to the scene of our former acquaintance with these birds. The tide was rather high, so we spent several hours in the nearby woods, until two o'clock in the afternoon, when we entered the marsh, and began our search.

The birds were there in numbers, and as each place seemed as likely looking as the next, our search was rather erratic. Watching a certain individual bird, we would mark where it lit, and go cautiously toward the place, flush it fairly close, and then burrow into the tall grass to see what was possible; and very little was to be seen, as the grass is tall, grows in heavy clumps, and possesses needle like points, which pierce cloth with no trouble whatever. A half hour's work of this kind yielded no return, so we left the wide stretches of marsh, and started to examine certain isolated clumps, growing here and there over the mud. Meanwhile the birds were all around us, and singing constantly. The song is very peculiar, consisting of a sort of guttural roll, heard only when the observer is very near the bird, then a short trill, ending with a strange rasping buzz.

We started at the clumps, each taking one and walking slowly through it, parting the grass from right to left, and getting as low down as the needles would allow us. As I was going through a rather small bunch, I suddenly found myself looking down on a nest with three eggs. We examined the nest critically, then retired a short distance, and were soon rewarded by seeing a sparrow fly into the clump, and upon going to the place, flushed it from the nest. We returned to the car, and taking a camera, the nest and location were photographed.

This done we looked for others, and shortly afterward, Chamberlain found a nest with four eggs, and we flushed the bird from it a few minutes later. In the course of the afternoon three more were found, one with a broken egg, and two fresh nests. All of them were composed of grass, attached to the stems of the marsh grass from four to six inches from the ground, and as a rule, nearer the outside of the clump.

As noted above, it has been supposed that this form bred on our coast, and I quote from A. T. Wayne's 'Birds of South Carolina' as follows:

"I have been unable to find this form breeding on our coast, yet it is possible that it does, since the young in first plumage occurred during the

second week in July, and the adults in worn breeding plumage are to be seen during the third week in July. A distinct northward migration takes place about April 16, and continues until April 27, when all the birds have gone north, and of course to their breeding grounds."

One or two very old nests were also found, presumably last year's, and there can be little doubt that these birds have bred here for years. At any rate the doubt which has been associated with the breeding of this form on the South Carolina coast has been dispelled.

I immediately wrote Mr. Wayne about the finding of the nests, and he made a trip soon after to the same general locality, and succeeded in finding two nests himself.

Chamberlain and I again visited the marsh on May 22, and caught a young bird of this form that could fly with ease, for about twenty-five yards. It seems strange that the nest and fresh eggs should have been discovered only six days previously. We have been unable to find any more eggs, but have noted several young which fly well.—ALEXANDER SPRUNT, JR., *Charleston Museum, Charleston, S. C.*

Melospiza melodia atlantica on the Coast of South Carolina.—In 'The Auk' for January, 1924, pages 147–148, Mr. W. E. Clyde Todd has described a new race of the Song Sparrow from Smith's Island, Virginia. As soon as I had read his description I knew that I had taken near Charleston about 37 years ago several specimens of this bird, but do not possess them now. I therefore made a systematic search from February 12 to March 1, 1924 for this new bird and obtained five typical specimens, these being compared with two birds that my friend Mr. J. H. Riley sent me from the U. S. National Museum collection taken at Smith's Island, Va. This bird *atlantica* is outnumbered in winter by a red Song Sparrow in the proportion of five hundred or more of the latter to one of the former. This is an addition to the fauna of South Carolina.—ARTHUR T. WAYNE, *Mount Pleasant, S. C.*

The Scarlet Tanager (Piranga erythromelas) on the Coast of South Carolina.—Although this species has been taken on the coast of South Carolina on a few former occasions, the dates of which are given below, this record is of interest in that no specimen, heretofore, has been taken on any coast island, or in such close proximity to the ocean.

The writer, together with his wife, and Mr. E. Burnham Chamberlain, were spending a few days on Sullivan's Island, one of the barrier islands of the South Carolina coast about five or six miles north of the city of Charleston. The object of our stay was to collect certain species of shore-birds for the Charleston Museum, with which the writer and Mr. Chamberlain are connected. On the afternoon of May 1, all three of us were walking along the back beach of the island, and had just secured two Least Sandpipers, and had gone over to a nearby unoccupied house.

While there, my wife asked how many records there were for the Scarlet

Tanager for the coast of this State. I replied about six or seven, whereupon she said that there was a bird in a large myrtle bush a short distance away, that she thought was a Scarlet Tanager, as the red color was very different from that of the Cardinal, and that she could see black on the wings. I knew that she was familiar with the species, as she has seen it in the North Carolina mountains.

Naturally investigation promptly followed, and the bird was plainly seen in a few moments by Mr. Chamberlain, as it left the myrtle bush and alighted on a wire fence close by, where he shot it. It is a beautiful male in fine plumage, and was mounted for the museum collection. The distance from where the bird was shot to the ocean could not have been over five hundred yards.

Below are the dates on which the former specimens have been secured, all A. T. Wayne's records;

April 29, 1884, Oakley, S. C. Not taken.
April 30, 1889, Mt. Pleasant, S. C. Taken.
May 4, 1911, " " " "
May 1, 1912, " " " "
May 6, 1921, McPhersonville, S. C. "
May 1, 1919, Mt. Pleasant, S. C. Not taken.
May 11, 1923, Fairlawn, S. C. Taken
May 2, 1924, Mt. Pleasant, S. C. Taken.

In addition to these records there are three observations from city bird students, two from H. R. Sass, and one from Mrs. Robert Wilson. Last year, 1923, one was taken in Summerville by S. G. Ball on April 23.—ALEXANDER SPRUNT, JR., *Charleston Museum, Charleston, S. C.*

A Remarkable Cedar Waxwing (Bombycilla cedrorum).—On March 18, 1924, I took in my yard from a Pride of India tree a Cedar bird that has the outermost right rectrix pure satiny white of the same length as the other normal (11) black ones, being tipped with yellow also of the same length as the other eleven feathers. The fact that the single white feather is not entirely white throughout its length, but tipped with yellow as all the others seems to me to be unique in albinism.—ARTHUR T. WAYNE, *Mount Pleasant, S. C.*

Blackpoll Warbler in Denver, Colorado.—On May 24, 1924, I detected a single individual of this species (*Dendroica striata*) in Cheesman Park, Denver. This is one of the rarest of Colorado's Warblers, in fact it is so rare that it has never before, in more than thirty years, come under my notice in the State. So far as I am now able to determine this record seems to be the first for the species in Denver, and together with additions since made to the last publication of a Denver List (Wilson Bull., Sept., 1917) makes two hundred and seven species and subspecies recorded as occurring within the present corporate limits of the city.—W. H. BERGTOLD, *1159 Race St., Denver, Colo.*

Yellow-breasted Chat (Icteria virens) in New Hampshire.—Mr. Charles F. Goodhue of Webster, N. H., kindly authorizes me to communicate the fact that he has in his collection a Yellow-breasted Chat (*Icteria virens*), that was picked up in West Concord, N. H., in 1909, about Sept. 6. I think no other specimen has been reported from this state.—FRANCIS BEACH WHITE, *Concord, N. H.*

Destruction of Birds in S. C.—A Correction.—In my note on this subject in the January 1924 'Auk' I unwittingly did injustice to Mr. Arthur T. Wayne by apparently ignoring the accounts which he had written of both the storm of 1893 ('Auk', 1894, p. 85) and the blizzard of 1899 ('Auk', 1899, p. 197). I was unfortunately not a reader of 'The Auk' at the time his accounts appeared and was unaware of them until after my note was published.—JOHN HENRY RICE, JR., *Wiggins, S. C.*

RECENT LITERATURE.

Grinnell and Storer on Animal Life in the Yosemite.—The latest contribution[1] from the Museum of Vertebrate Zoology of the University of California is a portly volume on the terrestrial vertebrates of the Yosemite by Dr. Joseph Grinnell and Mr. Tracy I. Storer, published by the University. The theme of the work, as the authors tell us "is natural history—that which relates to the living animal," while their aim has been to assemble their materials with every precaution to insure accuracy of fact and correctness of inference. No sacrifice of precision has been made consciously with the end merely of affording "attractive reading" but technical terms, where the same idea could be expressed in familiar words, have been avoided—i. e. "to present our science—perfectly good science, in straightforward, readable form." In this effort they seem to have been eminently successful and we have a volume which combines a useful description of field characters of each species with a detailed statement of its distribution in the Yosemite region and an account of its habits, etc., based on the observations of the museum corps. Naturally there is considerable difference in the length of these accounts, the commoner forms being much more exhaustively treated. The total number of species and subspecies noted in the region covered was 362—97 mammals, 231 birds, 22 reptiles and 12 amphibians.

[1]Animal Life in the Yosemite: An account of the Mammals, Birds, Reptiles and Amphibians in a Cross Section of the Sierra Nevada, by Joseph Grinnell and Tracy Irwin Storer. Contribution from the Museum of Vertebrate Zoology, University of California (Seal) University of California Press, Berkeley, California, 1924. Pp. i–xviii + 1–752, pls. 1–12 and 61–62 (maps) in colors; pls. 13–60 numbered as pages. April 17, 1924. Price bound in buckram $7.50, carriage extra, weight 5 lbs. 9 oz.

The area covered forms a narrow rectangle about 89 x 17 miles or 1547 square miles reaching from the eastern margin of the San Joaquin valley to the western margin of the Great Basin constituting a typical cross section of the central Sierra Nevada, from 250 ft. elevation at Snelling, on the west, to 13,000 ft. on Mt. Lyall, including the celebrated Yosemite Valley but excluding the Mariposa Grove of Big Trees and the Hetch Hetchy Valley.

The field work upon which the report is based covered parts of 1914–1916 and 1919–1920 and no data obtained after December 31, 1920, are included. The field work covered 957 "man days" (one man in the field one day). The personnel included Joseph Grinnell, Tracey I. Storer, W. P. Taylor, Joseph Dixon, C. L. Camp, G. F. Ferris, C. D. Holliger, and D. D. MacLean. Two thousand pages of field notes, 4354 specimens and 700 photographs were obtained.

Needless to say this work forms a splendid record of the wild life of one of the best known of our national parks, a record made none too soon as the accounts of the extermination of several species show. Moreover while the botany and the general features of the Yosemite have been pretty thoroughly treated, practically nothing has hitherto been published upon its zoology. The book will therefore be most welcome to all who have visited or who contemplate visiting this natural wonderland.

It has, however, a much wider interest than that of a local zoology. The careful and entertaining accounts of the activities of the animals of the Yosemite constitute some of the most important contributions to their life histories that have appeared, while the introductory chapters on "Distribution," "Bird Censuses" and the "Interrelations of Living Things" contain information and discussion of more than ordinary importance.

Leaving the carefu lperusal of the accounts of the various animals, which make up the bulk of the text, to the fortunate possessors of the volume we may here comment briefly upon some of the points in the introductory chapters. Under "Distribution," besides mapping the region and showing graphically the range of each species, the authors contrast the easy western slope of the Sierra Nevada with the abrupt eastern declivity and bring out the fact that in the former there is room for the development of a separate representation of species in each zone while in the latter the zones are crowded together—"telescoped as it were," and are much more difficult to delimit, as peculiar admixtures and arrangements of species occur. At Walker Lake, for instance, the Canadian Zone occupies the cool shaded bed of a glacial groove with the Transition occurring on sun-facing exposures well above it. The authors here and elsewhere express their belief that the principal physical factor in zonation is not altitude, or moisture, or soil, *per se*, but temperature.

Besides the zonal delimitations the characteristic associations under each are mentioned and the further habitat divisions called "ecologic niches" are explained—such as the tree trunk, the small twiggery and the terminal foliage, each of which has its characteristic birds, or, as another example,

the arboreal and terrestrial chipmunks of identical zonal or associational range. All in all this chapter is as clear an exposition of the principles of geographic distribution as we remember to have read. The comparison of man, who can live under all sorts of physical conditions by changing his clothing and behaviour, with the animals and plants which cannot do this and are so vitally affected by conditions of temperature, moisture or food supply that they can maintain existence only within a relative narrow range of critical conditions, is most happy.

Discussing the interrelations of living things the authors set down opinions with which the reviewer is in hearty accord. "Forests afford the means of existence for a great number of animals" is their first offering followed "with some caution" by another: "Forests depend for their maintenance in the condition in which we observe them in this age of the world, upon the activities, severally and combined, of the animals which inhabit them." Then follow the opinions that it is the burrowing animals which make the ground suitable for plant growth; that it is the disintegration of vegetable matter—dead wood, bark, leaves, etc., by animals that helps to enrich the ground; that insect destroyers which protect live trees, like Woodpeckers and Chickadees, need dead tree trunks to nest in; that harmful as some insects may become it is of advantage to the forest that a continuous moderate supply of insects be maintained for the support of a standing army of insectivorous birds, which army will turn its attention to whatever insect plague happens suddenly to manifest itself. The authors would finally claim "a nice interdependence by which the insect and the bird; the bird and the tree; the tree and the insect all are under average circumstances mutually benefited." It would be well if those who are intent on burning up every dead tree and limb in our woodland and on effecting the extermination of what they often ignorantly call "vermin" would read and profit from this chapter.

The importance of the bird census is fully elaborated and the method employed by the authors is explained. Instead of making one count for a day's trip they make a separate count for each hour of a hike which can later be correllated with the character of country traversed.

But there is too much "meat" in this report to be covered in the small space at our disposal. It should be on the shelves of everyone interested in the study of wild life and should be read carefully as a model of its kind.

There are sixty plates, twelve in colors from paintings by Allan Brooks, the others in half-tone, and sixty-five figures in the text. Some of the birds and mammals are photographed from recently killed specimens but while these serve well to show contrasts of characters in a technical work they seem a little ghastly for a work the keynote of which is the study of the live animal.—W. S.

Howell's 'Birds of Alabama.'—This work[1] published by the Department of Game and Fisheries of Alabama in cooperation with the U. S. Biological Survey has been eagerly looked for ever since the completion of Mr. Howell's field work in 1916 and as it finally appears it is a most satisfactory State list, particularly welcome as no adequate work on the birds of Alabama has hitherto been published. Besides the records of occurrence with migration data, etc., which usually comprise the text of such works, Mr. Howell has prepared paragraphs on "General Habits" and "Food Habits," the latter compiled mainly from publications of the Biological Survey, which add very materially to the interest and value of the report. The introduction deals with early explorations in the State and the leading local lists, with brief discussions of the economic value of birds in general, protective legislation and the faunal areas of Alabama. The latter subject however is fully dealt with in the author's earlier publication 'A Biological Survey of Alabama' (N. A. Fauna, No. 45) published by the Biological Survey in 1921. There is also a full bibliography of papers relating to Alabama birds and a good index. The text-figures are mainly coarse line drawings by R. J. Sim, while the plates represent, for the most part, views of different types of country in various parts of the State.

The accounts of the Southern Crow and Alabama Towhee, both forms described as new by the author in earlier publications, are most welcome, as they give us some idea of their distribution. In the case of the Blue Jay it is significant to find that Mr. Howell and his assistants failed to note a single example of the northern form in Alabama while the bird banders operating in southern Georgia have been identifying certain of the birds handled by them as northern Jays. It would seem that the collecting of a specimen would be desirable in a case of this kind as it makes a great difference in the value of the returns according to which form was actually banded. Mr. Howell's work will be of the greatest value to ornithologists at large as a work of reference and should stimulate bird study and bird protection in Alabama in no small degree.—W. S.

Beebe's 'Galapagos.'[2]—William Beebe's latest book, a quarto of over 400 pages, deals with the Galapagos Islands long famous for their peculiar

[1]Birds of Alabama, by Arthur H. Howell, Assistant Biologist, Bureau of Biological Survey, United States Department of Agriculture. Issued in cooperation with the United States Department of Agriculture Bureau of Biological Survey, Edward W. Nelson, Chief of Bureau, by the Department of Game and Fisheries of Alabama, I. T. Quinn, Commissioner (Seal) Brown Printing Company, State Printers and Binders, Montgomery, Ala., 1924. Pp. 1–384, pls. I–VII. Several text figures.

[2]Galapagos | World's End | By | William Beebe | Director of the Department of Tropical Research of the | New York Zoological Society, etc. | Author of 'Jungle Peace,' 'Edge of the Jungle,' | 'A Monograph of the Pheasants,' etc. | With 24 Colored Illustrations by Isabel Cooper, and | 83 Photographs mostly by John Tee-Van | Published under the auspices | of the | New York Zoological Society | G. P. Putnam's Sons | New York & London | The Knickerbocker Press | 1924. i–xxi + 1–443. Price $9.00.

fauna and inhospitable barren character. This volume is the outcome of a trip on the yacht "Noma" initiated and financed by Mr. Harrison Williams in the interest of the New York Zoological Park. Besides Mr. Williams and Mr. Beebe there were twelve other members of the party including artists, photographers, taxidermist, etc. The trip was made by way of Panama and extended from March 1 to May 16, 1923, less than one hundred hours being actually spent on the islands, the smaller of which received the most attention.

The scientific reports on the collections made are being published in 'Zoologica,' the journal of the Zoological Society, and the present volume is a narrative and description of the trip with historical and other incidents. While most of the book is from Mr. Beebe's pen there are two chapters by Ruth Rose, historian of the party, and one by Robert G. McKay on game fishing in the Galapagos. There are also two appendices, one giving the technical names of the animals mentioned in the text and the other a bibliography of the more important publications relating to the islands.

The text is in Mr. Beebe's well known style and presents vivid pictures of these remote desert islands and their strange fauna—Giant Tortoises and Iguanos, Flightless Cormorants, Fork-tailed Gulls, Sea Lions, curious Crustaceans, etc., while the well known problem of the Finches which inhabit the group and differ in such a perplexing way on each island is discussed. While not making any claim to being a scientific monograph or of adding materially to our knowledge of the islands, Mr. Beebe's volume gives us a clearer idea of the life histories and surroundings of the various animals of the Galapagos than can be obtained in the more technical publications on the fauna, and has brought a knowledge of these most interesting islands within the reach of thousands of persons to whom Galapagos has heretofore been simply a name, besides presenting a most readable and entertaining tale of present day adventure.

The illustrations are numerous and excellent in character. There are 82 half-tones from photographs and eight colored plates of reptiles, fish and invertebrates. A foreword by Dr. Henry Fairfield Osborn entitled 'In the Wake of Darwin,' reminds us of the cruise of 'The Beagle' in 1835 and the observations of the immortal naturalist who first described the remarkable life of these remote islands with which his name has ever been so closely associated.

The work is fittingly dedicated to Harrison Williams to whose liberality science is indebted for the collections and observations which the cruise has brought together.—W. S.

Dr. Dewar's 'The Bird as a Diver.'[1]—This book is an illustration of the possibilities of issuing specialized publications which seem to be enjoyed

[1] The Bird as a Diver. A Contribution to the Natural History of Diving Birds. By John M. Dewar, M.D. London, H. F. & G. Witherby, 326 High Holborn, W. C. 1924. Pp. i–xii + 1–173. Price 10 shillings and 6 pence.

by our coworkers across the water. It would be difficult to publish a work treating only of the diving of birds in the United States and still more difficult to publish one such as this which concerns itself almost entirely with one phase of the subject, the "time-depth relation," as the author terms it. The leading characteristic of the diving habit he tells us is the relation of the average period of the dive to the average depth of water. In the first 15 chapters of the book this relation and other problems of the diving bird are treated as a whole, following which are accounts of the several species of diving birds separately.

The birds which the author has studied comprise nine Ducks, two Cormorants, four Grebes, three Divers (Loons), four Auks and the Coot; while the total number of dives, observed and timed, was 5991. These data naturally offer much opportunity for tabulation and averaging with consideration of mean variations and percentages so that the work has a distinct mathematical flavor.

It is pointed out that there are two principal types of diving; "pelagic," where the bird seeks its food in the intermediate layers of water; and "bottom" diving, where it feeds only on the bottom. Moreover "plungers," such as Terns and Gannets, are excluded from the divers altogether, as they enter the water wholly by the momentum gained from the plunge from a varying distance above the surface and are unable to control their actions under water.

The author finds that depth of water is the principal factor determining the period or duration of the dive and that the average duration of the pause is nearly always less than that of the dive, except in the Coot. The diving habit he decides is polyphyletic in origin, being traced back to surface feeding through "tilting" and "dipping." The Auks have reduced the time of the pause more than other groups and in this and other factors, which make for efficiency in diving, they lead the diving birds, the other groups ranking as follows: Loons. Cormorants, Grebes, Diving Ducks and Coots.

The time-depth relation of diving birds is stated to be expressed by the rule of twenty seconds for the first fathom of depth and ten additional seconds for each additional fathom. The longest dives observed by the author did not last more than seventy seconds nor extend to a greater depth than six fathoms though he gives two minutes and ten fathoms as the longest time and greatest depth observed by others.

There is a mass of information here presented from which deductions may be made but we cannot but regret that the author's observations did not include some study of other aspects of the problem such as the use of wings under water, and other matters which have been the subject of some dispute. He truly says that very little is known in regard to what the diving bird does under water, and admits that the scattered reports in the literature have mostly been based upon chance observations and that many of them are mutually contradictory. The difficulties in the

matter are, as he truly says, inseparable from observation in a medium other than air.

We heartily commend this book especially to those who have made contributions to the subject as we feel that a careful correlation of Dr. Dewar's observations with their own may help to reach more definite and consistent results on some of the other problems of the diving bird and its activities.—W. S.

Tait's 'The Birds of Portugal.'[1]—This handsomely printed volume treats of the bird life of a country which has been much neglected ornithologically. The author, Mr. Wm. C. Tait, a resident of Oporto and a member of the British Ornithologists' Union, is the leading authority on the subject and has published a previous list of the birds of Portugal in 'The Ibis' for 1887.

The present volume brings the subject up to date. No descriptions are included, as they are readily available in the manuals on the birds of Great Britain and Europe, but details of occurrence and distribution are presented in a readable manner with many interesting bits of folk-lore and history, while there is a very full list of local vernacular names, remarkably large for the size of the country.

The author has had the cooperation of Mr. H. F. Witherby, who has travelled in Portugal and furnished technical data on subspecific identifications, etc., but resident bird students appear to be very scarce, in fact Mr. Tait states that the only living Portuguese field ornithologist known to him is Mr. Joao Alves dos Reis. It would seem a pity that at least an abridged edition of this work could not have been issued in Portuguese as a stimulant to local bird-study.

Introductory chapters deal with the physical features of the country and with migration while two appendices present a bibliography and a list of "ringed' birds recovered in Portugal. A good colored map and a number of half-tone reproductions of photographs of the country complete this excellent publication.—W. S.

Lowe's 'Literature of the Charadriiformes.'[2]—Bibliographic works are such laborious undertakings that we always feel that a double measure of thanks is due to the author who produces a reliable publication in this field, and such a one undoubtedly is Dr. G. C. Lowe's volume on the literature of the Charadriiformes. He considers the twenty-fourth volume of the British Museum Catalogue of Birds as bringing the subject up to

[1] The Birds of Portugal. By William C. Tait, Fellow of the Zoological Society and Member of the British Ornithologists' Union. H. F. & G. Witherby, 326 High Holborn, W. C. I. 1924. Pp. i–viii + 1–260. pls. I–X and a map. Price 18 shillings.

[2] The Literature of | the Charadriiformes | from 1894–1924 | with a classification of the order, and | lists of the genera, species and subspecies | By | George C. Lowe, M. A., M.D., | M. R. C. P., F. Z. S., M. B. O. U. | H. F. & G. Witherby | 326 High Holborn, W. C. I. | 1924 | pp. i–xi + 1–220. Price 12 shillings and 6 pence.

1894 and therefore concerns himself only with publications from that time to date—approximately thirty years. There are a number of general papers listed, in which the "shore-birds" figure only as part of a general discussion of the avifauna of some region, then follow the various families and genera, the papers under each being arranged chronologically.

Besides being a bibliography the work is in a measure a check-list, as well, since the whole question of nomenclature and classification has necessarily been considered, with the result that we have the latest name for each species with the older equivalents given in lighter type. Several of the best schemes of classification are also presented and lists of the genera both systematic and alphabetical, all of which adds very materially to the value of the work.

The titles are not always verbatim and matter relating to the group under consideration is often re-entered in the systematic part of the work after the general paper in which it appeared has been listed in the first section; annotations are often added, too, which give one an idea of the character of the contents of a paper—all helpful features.

As we look through the pages, Dr. Lowe seems to have done his work very thoroughly and carefully, though of course only actual use of such a publication will demonstrate its value. As a slight test the reviewer has looked up his own publications dealing with the family and finds all listed except a general paper on the birds obtained by McIlhenny in Alaska (Proc. Acad. Nat. Sci. Phila., 1900), in which several pages are devoted to the Charadriiformes especially with regard to their molt, and one in 'The Ibis' for April, 1901 on "Moult and Color Change," in which the molt of the Sanderling is discussed at some length. These are the sort of papers which it is most difficult to list as there is no intimation in the title as to what species may be discussed and they are mentioned in no spirit of criticism but simply to call attention to the difficulties in bibliographic work. We all, I think, hold in abomination the host of small papers of a page or two each, dealing with a single new subspecies or a single contribution to some broad problem, with which our desks are flooded, and yet they are all catalogued in full in bibliographies while more thorough treatments of the same matters contained in longer contributions under a general heading are lost sight of. The 'Auk' Indexes are splendid examples of "bibliographies" in which every mention of every species is indexed and they might well have been mentioned by Dr. Lowe as important sources of information wherein many references necessarily omitted in his bibliography would be come upon.

Dr. Lowe's volume will prove of the greatest assistance to ornithologists in general and to editors in particular to whom bibliographies are indispensable and as we said above he deserves the thanks of all bird students for his helpful and painstaking work.—W. S.

Swarth on the Birds of the Skeena River Region, B. C.—This is a report[1] on the results of another of the field explorations conducted by the Museum of Vertebrate Zoology of the University of California under the patronage of Miss Annie M. Alexander during the summer of 1921. The region covered lies on the east of the Coast Range, with a flora and fauna related to the interior country and similar in a general way to that of the Upper Stikine River district, already reported upon by the same author. Mr. Swarth found the fauna of the valleys to be Canadian while a well defined Hudsonian belt was present on the mountains and the treeless peaks showed Alpine-Arctic characteristics. We note in the portion of the report relating to the birds that the Rock Ptarmigan of the region proved to be quite distinct from *Lagopus r. dixoni* of the Aleutian Islands and probably represents a new sub-species. Material obtained seems to show that *Dryobates p. glacialis* Grinnell, of Alaska, is identical with the Rocky Mountain Downy Woodpecker *D. p. homorus* which however should be known by the earlier name *leucurus* Hartlaub. The specimens of Pigeon Hawks obtained show pretty clearly that the three forms, *columbarius*, *suckleyi* and *richardsoni* are all subspecies of a single species, *Falco columbarius*. Mr. Swarth also considers that *Parus hudsonius columbianus* Rhoads is a valid form, while he gives some interesting data on the molt of the Pipit. The report is a valuable contribution to our knowledge of the fauna of the north-west.—W. S.

Sclater's 'Systema Avium Ethiopicarum.'[2]—The first part of this important work is before us, covering the families from the Struthionidae through the Picidae, essentially in the order adopted by A. H. Evans in the bird volume of the 'Cambridge Natural History.' The plan of treatment follows that of the A. O. U. and B. O. U. 'Check-Lists' in practically all details, a binomial group name appearing at the head of each series of subspecies, the usual generic headings, with references and type localities, etc. In addition there are foot notes referring to certain changes from current nomenclature and references to revisions of groups. The nomenclature follows the International Code as nearly as possible, but, as the author truly says, there is a certain amount of ambiguity in the application of some of the rules which leaves the correct names for certain species still in doubt.

Common names are given to all recognized forms but some of them are so cumbersome that they are little better than Latin trinomials and will

[1] Birds and Mammals of the Skeena River Region of Northern British Columbia. By Harry S. Swarth, Univ. Calif. Publications in Zoology. Vol. 24, No. 3, pp. 315–394, pls. 9–11, January 24, 1924.

[2] Systema Avium Ethiopicarum. A Systematic List of the Birds of the Ethiopian Region. By William Lutley Sclater, M. A., M. B. O. U. Prepared in conjunction with Special Committees of the British and American Ornithologists' Unions, Part I. Pp. 1–304. Published 30th April, 1924. Published by the British Ornithologists. Union and sold by Wheldon and Wesley, Ltd., 2–4 Arthur Street, New Oxford Street, W. C. 2. 1924. Pp. i–iv + 1–304. Price £1.1.0 ($4.89).

hardly commend themselves to general usage. Examples of such names are the "Fernando Po Chocolate-backed Kingfisher" and the "Gold Coast Thick-billed Honey Guide."

We particularly endorse the conservatism in the recognition of genera and the frequent use of the convenient sub-genus, which serves all the purposes of the present day "genus" without destroying familiar nomenclature.

The value of a work of this kind which brings together all the forms of African birds under one cover cannot be overestimated. Furthermore we feel that the best and perhaps the only way to produce works of this sort is to place the task in the hands of one man who can consult as many others as he may desire but who can make the final decisions on moot points himself and thus establish a reasonable uniformity of treatment not to be attained by any Committee ruling. While we cannot speak for the B. O. U. Committee, Mr. Sclater, so far as the A. O. U. Committee is concerned, has been absolutely unhampered and we fear that there has been some little misunderstanding regarding the cooperation of the American Committee since the proofs were certainly not approved by this body as stated. Indeed the Committee has held no meetings since they were prepared and the reviewer who happens to be Chairman of the Committee never saw them. We make this statement in no spirit of criticism but simply to give credit where credit is due—namely to Mr. Sclater. We shall look forward with interest to the remaining part of this 'Systema' and trust that others on the same plan may soon make their appearance. —W. S.

Hellmayr and Zimmer on New South American Birds.—Two important papers have appeared in the publications of the Field Museum describing new birds obtained by the Captain Marshall Field Expeditions recently sent to South America, one dealing with Chilean species by Dr. Hellmayr[1] and one on Peruvian forms by John T. Zimmer.[2] In the former are proposed *Sclerorchilus albicollis atacamae* (p. 71) Caldera, Atacama; *Geositta cunicularia deserticolor* (p. 72) Caldera, Atacama; *Muscisaxicola rufivertex sanborni* (p. 73) Romero, Coquimbo; and *Troglodytes musculus atacamensis* (p. 74), Rio Loa, Antofogasta.

Mr. Zimmer proposes twelve new forms of the genera *Gymnopelia*, *Chalcostigma*, *Siptornis*, *Cranioleuca*, *Xenops*, *Euchlornis*, *Phrygilus* and *Cassicus*.

By a casual mention under one of the descriptions it would seem that specimens were borrowed for comparison from other institutions in the preparation of one of these papers at least. If this is so, by all customs and courtesies, existing among ornithologists, the fact should be stated in the

[1]New Birds from Chile. By C. E. Hellmayr. Field Museum of Natural History Publication 219. Zool. Series XII, No. 5, April 19, 1924. Pp. 71–75

[2]New Birds from Central Peru. By John T. Zimmer. Ibid No. 4. April 19, 1924. Pp. 51–67.

introduction and for the benefit of other students specimens of each form and its allies used in the study might be listed with the names of the institutions to which they belong; the student of the future will then know exactly upon what material decisions were based and can reassemble the series if desired.

These are but preliminary papers and they give promise of most interesting and valuable contributions to our knowledge of the bird-life of southern South America.—W. S.

Bannerman on African Bulbuls.[1]—Mr. Bannerman has had occasion to work out the relationship of a number of the African Pycnonotidae and presents a list of the species represented in the British Museum collection arranged in the genera which it seems to him should be recognized—eleven in number. No keys or diagnoses are given. While a little more liberal than some of his predecessors in the recognition of genera Mr. Bannerman exercises a commendable conservatism and we note in footnotes that he finds himself unable to recognize two groups *Eurillas* and *Stelgidillas* proposed by Oberholser for species of *Andropadus*.—W. S.

Poncy on Contents of Birds' Stomachs.[2]—In two short papers[3] M. Poncy presents a list of fish, insects, etc., found in the stomachs of shore and aquatic birds obtained in migration or in winter, on the shores of Lake Leman, Switzerland, and a list of materials found in a hollow in a beech tree which was occupied successively by a Green Woodpecker, an Owl and a Stock Dove.—W. S.

Richmond and Swales on New Haitian Birds.—A collection of some 200 birds from Gonave Island off the coast of Haiti, obtained for the U. S. National Museum by Dr. W. L. Abbott, contained several forms which differed slightly from the Haitian species and these have been named[4] by Dr. Richmond and Mr. Swales as follows: *Saurothera longirostris petersi* (p. 105), *Calyptophilus frugivorus abbotti* (p. 106) and *Phaenicophilus poliocephalus coryi* (p. 107). Dr. Abbott's Haitian and San Domingo collections made from 1916 to 1923 total some 1400 skins.—W. S.

---

[1] A Revision of the African Bulbuls (Pycnonotidae) in the British Museum, with a list of all species and subspecies contained in the collection. By David A. Bannerman. Rev. Zool. Africaine. Vol. XII, fasc. I. 1924. Pp. 17–38.

[2] Contenus Stomacaux d'Echassiers et de Palmipèdes. par R. Poncy.

[3] Liste des trouvailles faites en Septembre 1923 dans la cavité arbre habité successivelement par Pic-Vert, la Chouette Hulotte et le Pigeon Colombin. par R. Poncy. Bull. de la Société Zoologique de Genève. III, fasc. 3, January, 1924.

[4] Descriptions of Three New Birds from Gonave Island, Haiti. By Chas. W. Richmond and Bradshaw H. Swales. Proc. Biol. Soc. Washington, Vol. 37, pp. 105–108, March 17, 1924.

Bannerman and Bates on Birds of Cameroon.[1]—This paper consists of systematic notes on the birds obtained by Mr. Bates on his journey through the highlands of Cameroon, across into Nigeria almost to Lake Chad and back to the coast by the Niger River; a narrative of which appeared previously in 'The Ibis' forming Part I of the report. The "notes" contain a great deal of valuable information on the distribution and relationship of the species obtained. The Turacos are considered with reference to the new genus *Proturacus* previously proposed and which, while a perfectly typical *Turacus* in coloration differs entirely in the structure of the bill, a case parallel to that of the Cuckoos, *Urococcyx*, *Rhinococcyx* and *Dryococcyx*. There is also a plate of two species of *Mirafra* discovered on the expedition.

We are glad to learn that Mr. Bates, who has returned to Cameroon from England, is preparing a work on the birds of the Cameroon district in which he has made so many notable discoveries.—W. S.

Lönnberg on Birds from Kansu.[2]—In this short paper a number of interesting Chinese birds are discussed. The collection upon which the report is based included eighty species and was made for the Royal Natural History Museum at Stockholm by D. Sjölander. The variation in the Bean Goose and the Honey Buzzard are considered at length.—W. S.

Witherby's 'Check-list of British Birds.'—This little volume[3] is a check-list compiled from 'The Practical Handbook' and intended to be used for labelling, reference, notes, local lists, etc. It is printed only on the left hand pages so that it may be readily cut up for labelling or the right hand pages used for notes. The nomenclature is brought up to date at the end of 1923; generic and family headings are given; technical names are in italics and vernacular names in heavy faced type immediately below, with a brief statement (covering from one to four lines) of the distribution, to the right. There are 496 forms listed representing 418 species. These are divided as follows: residents 50; occasional breeders 18—making 208 breeding forms; winter visitants 76; of occasional occurrence 229 and extinct 1.

The list seems to be admirably adapted to its purposes and a model for a work of the kind.—W. S.

---

[1] On Birds Collected in North-western and Northern Cameroon and Parts of Northern Nigeria. Part II. Systematic Notes. By David A. Bannerman, and George L. Bates. Ibis, April, 1924. Pp. 199–277.

[2] Notes on Some Birds from Kansu, China. By Einar Lönnberg, Ibis, April, 1924. Pp. 308–328.

[3] A Check-list of British Birds with a short account of the status of each compiled from 'A Practical Handbook of British Birds.' By H. F. Witherby. Pp. 1–78. 1924. Price 3 shillings and 6 pence.

Recent Papers by Hartert.—Dr. Hartert has published the fourth part[1] of the list of types in the general series of the Tring Museum, comprising Nos. 1183–1302 and covering the Bee-eaters, Parrots, Kingfishers, etc. Several forms are described as new, viz., *Lorius roratus goodsoni* (p. 123) Manus, Admiralty Islands; *Tanygnathus megalorhynchos floris* (p. 126) South Flores and *T. m. djampeae* (p. 126) Djampea Island. In another paper[2] he considers the birds of New Hanover, the northernmost of the larger islands of the Bismarck Archipelago. The collection described was made by A. F. Eichorn and comprised sixty-two species of which *Rhipidura rufiventris albertorum* (p. 207) and *Lalage karu albidior* (p. 208) are described as new. A third paper[3] describes the birds obtained on Capt. Buchanan's second Sahara expedition which traversed the Sahara to Algeria between Hausaland and Aïr. Three new forms are described: *Athene noctua solitudinis* (p. 18) Mt. Todera; *Lybius vieilloti buchanani* (p. 23) Tebeig and *Ammomanes deserti geyri* (p. 41) Farak. His 'Notes on Some Birds from Buru'[4] is based on a collection made by the Pratt brothers who discovered the curious *Madanga ruficollis* allied to *Zosterops* and previously described by Rothschild and Hartert; eighteen species are discussed and there is a revision of the nomenclature of the races of *Porphyrio melanotus*.—W. S.

Dr. Weeks' Bird Poems.—Ornithology is an exceedingly broad subject and we turn from the technical descriptions of new subspecies and evolutionary problems to character portrayals of the various familiar birds without over-stepping its bounds. In this latter field poetry holds an important position and even the hardened closet ornithologist will find recreation and enjoyment in reading good bird poems.

As a contribution to this subject Dr. Leroy Titus Weeks has issued in a little volume of verse[5] a number of characterizations of common species,—Bobolink, Wren, Red-winged Blackbird, Chickadee, Robin, etc., in which the songs form the chief motif. The syllabification of bird songs has been tried by many, with greater or less success, but we think that some of Dr. Weeks' attempts are the most satisfactory that we have read. Who would not recognize his Robin singing:

> "Pillywink, pollywog, poodle, poodle,
> Pollywog, poodle, pillywink, pillywink,
> Poodle, poodle, pillywink, pollywog,
> Poodle, poodle."

---

[1] Types of Birds in the Tring Museum. By Ernst Hartert. Novitates Zoologicae, XXXI, pp. 112–134, March, 1924.

[2] The Birds of New Hanover. Ibid, pp. 194–213. March, 1924. By Ernst Hartert.

[3] Ornithological Results of Captain Buchanan's Second Sahara Expedition. By Ernst Hartert. Ibid, pp. 1–48. March, 1924.

[4] Notes on Some Birds from Buru. By Ernst Hartert. Ibid, pp. 104–111. March, 1924.

[5] The Poems of LeRoy Titus Weeks. Published by the Author, Second Edition. 1923. pp. 1–242.

Or the Thrasher:

"Pickerel, pickerel, pickerel,
Stickle-back, stickle-back,
Sculpin, sculpin."

"Kittiwake, kittiwake, kittiwake,
Curlew, curlew
Bobolink, bobolink, bobolink,
Whippoorwill, whippoorwill."

Many of the other poems too will appeal to the lovers of out-door life and nature. We congratulate Dr. Weeks upon his little volume which can well find a place on the shelves of any naturalist's library.—W. S.

Birds and the English Whitethorn.—Rev. E. A. Woodruffe-Peacock gives[1] a list of 22 species of English wild birds that feed on and disseminate the seeds of whitethorns (*Crataegus oxyacanthus* and *C. oxyacanthoides*). The Hawfinch and Greenfinch open these thick shelled seeds for the sake of the endosperm, hence do not come in the list of distributors. It is stated that seeds which have traversed the alimentary canal of a bird germinate a year ahead of those gathered by man and that formerly they were fed to turkeys before being sown in order to gain this advantage. —W. L. M.

Sapsuckers distributing diseases of trees.—The work of the true Sapsuckers (*Sphyrapicus*) is of such a character that it must be an important means of transmission of diseases of trees. Little has been recorded on this subject because these diseases themselves have been little studied. In the reviewer's bulletin on Woodpeckers in Relation to Trees and Wood Products (Biol. Surv. Bul. 39, 1911, p. 25) was recorded the occurrence of galls caused by the fungus *Peridermium cerebrum* in connection with Sapsucker work. During the study of the chestnut blight (*Diaporthe parasitica*) in Pennsylvania it was noted that Woodpecker work was associated with about one-tenth of the older lesions of this devastating disease.[2] Prof. M. B. Waite says[3] he has observed several cases where Sapsuckers were responsible for the transmission of the highly destructive pear blight (*Bacillus amylivorus*). These are the previously recorded instances of the distribution of plant diseases by Sapsuckers, that have come under the reviewer's eye. Now appears another relating to the red stain (*Fusarium negundi*) in the wood of boxelder. This stain which results in wood containing it being relegated to a lower grade also has been found to be carried from tree to tree by Sapsuckers.[4] In departing from

[1]The Naturalist, Nov. 1919, pp. 353–355.
[2]Fulton, H. R. Proc. Chestnut Blight Conference, 1912, p. 56
[3]Official Rep. 31st Fruit-growers' Convention Calif., 1906, p. 144.
[4]Hubert, Ernest E. Journ. Agr. Research, 26, No. 10, Dec. 8, 1923, pp. 447–457, ls. 1–3.

the habits of their tribe the Sapsuckers have not only deviated from a standard of solid economic worth but have assumed risks in the way of tree disease transmission the extent of which can scarcely be foretold. —W. L. M.

Mathews' 'The Birds of Australia.'[1]—Two additional parts of Volume XI of this work have appeared since our last notice. Four species of Pardalotidae and the single Australian Sun-bird are considered in the first pages of Part 4 while the rest of this and the whole of Part 5 are devoted to the great Australian family, the Honey-eaters—Melithreptidae, with which good progress has been made. Mr. Mathews contends that this represents a "composite unnatural group" "with one remarkable feature, in this instance the brush tongue."—W. S.

The Ornithological Journals.

Bird-Lore. XXVI, No. 3. March–April, 1924.

The Phoebe. By Mrs. H. N. Henderson.—Detailed account of nest building and rearing of two broods.

The Great Horned Owls of Buffalo Creek. By F. J. Pierce.—No locality mentioned.

My Robins. By M. B. Salmon.—Rearing a brood by hand.

Herding Domestic Turkeys in the West. By Charles Barnum.—Became perfectly accustomed to the presence of the herder and responded regularly to the human voice.

Excellent photographs of Mourning Dove brooding and feeding young. By Dr. F. N. Wilson.

The colored plate is by Fuertes and presents the Ruby-throated, Black-chinned and Calliope Hummingbirds.

The Condor. XXVI, No. 2. March–April, 1924.

Nesting of the Wood Duck in California. By Joseph Dixon. The most important contribution that has ever appeared on the life history of this Duck. In three instances where the young were seen to leave the nest they did so entirely without aid from the parent, fluttering down to the water eight to ten feet below, and the entire brood were out of the nest in two to three minutes after the first one left. Eighty per cent of the nests were over water. The paper is abundantly illustrated.

The Birds of the Todos Santos Islands. By John Van Denberg.

The Wilson Bulletin. XXXVI, No. 1. March, 1924.

Birds Observed in Southeastern Texas in May, 1923. By A. C. Bent. Annotated list of 198 species.

Ornithological Impressions of Fiji and New Zealand. By Dayton Stoner.

Nesting Birds of Lake County Oregon. By Dr. A. G. Prill.

---

[1]The Birds of Australia. By Gregory M. Mathews, Vol. XI, Part 4, February 20, 1924, Part 5, April 2, 1924.

The Oologist. XLI, No. 2. February, 1924.

With Canoe and Camera on Some Alberta Lakes. By A. D. Henderson.

With the Birds on Los Coronados Islands, Old Mexico. By Alfred Cookman.

Joint Bulletin Vermont Botanical and Bird Clubs. No. 9. October, 1923.

Nesting of the Red-breasted Nuthatch. By Duane E. Kent.

How to Attract Birds by Winter Feeding. By Anne E. Perkins.

Bulletin of the Essex County Ornithological Club. 1923.

The Voice and Courtship of the Crow. By C. W. Townsend.

Harlequin Duck in Essex County. By Charles B. Floyd.

Ipswich River Bird Trip. By Ralph Lawson.

Distances Travelled Daily by Some Birds. By Arthur H. Norton.

Numerous local records and a yearly list of the birds of Essex county observed during the year, follow.

The Comparative Oologist. I, No. 1. May, 1924.

The Nesting of the Green Ibis. By R. E. Symons.

An Oologist in Spitzbergen. By Maj. W. M. Congreve.

The Nidification of the Masked Finfoot. By T. Marlow.

A Brief Account of a Sojourn on Albemarle Island. By W. O. Dawson.

A Burmese Jungle Joy. By T. Marlow.—Nest of *Pitta cyanoptera*.

Many other articles mainly by W. L. Dawson, the editor, deal with his controversy with the "Santa Barbara Museum of Natural History and Comparative Oology" and the founding by him of a new "International Museum of Comparative Oology" in the same city. The main regret to the bird student who is not a member of either organization is that having accumulated over 30,000 birds' eggs for the former museum Mr. Dawson upon resigning from it must now solicit another contribution of eggs from collectors all over the world to build up a collection for the new museum. The birds seem to be the main sufferers. We trust some arrangement may be reached to obviate such useless destruction.

The journal is beautifully printed and illustrated by plates from the editor's 'Birds of California.'

El Hornero. III, No. 2. December, 1923. [In Spanish.]

The Petrels and Albatrosses of the South Atlantic. By Roberto Dabbene.

Birds of the Ribereña Region of the Provence of Buenos Aires. By Jose A. Pereyra.

Observations on Ornithological Pathology. By C. A. Marelli and F. A. Ubach.

The Partridge of Santa Cruz (Patagonia), *Tinamotis Ingoufi* Oust. By Antonio Pozzi.

The Ibis. (11th Series) VI, No. 2. April, 1924.

On the Birds Collected in Northwestern and Northern Cameroon and parts of Northern Nigeria,—Part II. Systematic Notes. By David A Bannerman and George L. Bates. (see p. 497 *antea*).

Birds of the Lake of Geneva. By H. G. Alexander.

Birds from the Red Sea Lights. By Claud B. Ticehurst.

On the Birds of South-east Yunnan, S. W. China. By J. D. LaTouche. —Part IV, conclusion.

Notes on Some Birds from Kansu, China. By Einar Lönnberg.

A Review of the Genus Burhinus. By Annie C. Meinertzhagen.

On the Nesting of some Nyasaland Ducks. By C. Clifton Roberts.

There is an obituary of the late H. Godwin-Austin with portrait.

Bulletin of the British Ornithologists' Club. No. CCLXXXV. March 4, 1924.

Lord Rothschild and Dr. Hartert describe seven new forms from St. Matthias Island north of New Hanover.

Col. Meinertzhagen has a review of the races of *Picus chlorolophus* and describes four new forms. He also discusses the differences between the European and American Snipe concluding that the only reliable character is the narrower outer tail feathers of the latter. He records a single example of the American bird from England.

Mr. E. C. Stuart Baker describes two new forms of *Acanthopneuste*, and one each of *Abrornis* and *Horeites*.

Bulletin of the British Ornithologists' Club. No. CCLXXXVI. March 31, 1924.

Mr. N. B. Kinnear describes *Graucalus papuensis wilkinsi* (p. 68) from Mt. Driven, Queensland and *Myzomela obscura aruensis* (p. 69) from the Aru Islands. Mr. G. Mathews has some additions to the synonymy of Australian birds and proposes two new forms.

Dr. van Someren describes a new *Cosmopsarus* and Dr. Ticehurst and Mr. Whistler two new birds from the Himalayas.

Bulletin of the British Ornithologists' Club. No. CCLXXXVII. April 26, 1924.

Dr. G. C. Lowe gives an illustrated account of the blood protozoa of birds. Mr. Kirke Swann describes *Accipiter nisus hibernicus* (p. 79) from Ireland and Mr. Stuart Baker *Suya crinigera assamica* (p. 80) from Shillong, Assam.

British Birds. XVII, No. 10. March 1, 1924.

Field-Notes from Cumberland. By R. H. Brown.

Manx Ornithological Notes. By P. G. Ralfe.

"British Birds" Marking Scheme. By H. F. Witherby. Progress for 1923.

British Birds. XVII, No. 11. April, 1924.

Ornithological Notes from Norfolk. By B. B. Riviere.

There is a further discussion by Col. Meinertzhagen on the differences between the European and American Snipe with illustrations.

British Birds. XVII, No. 12. May, 1924.

A Study of the Robin by Means of Marked Birds. By J. P. Burkitt.—This is a most interesting paper; the writer has ringed some thirty British Robins putting light and dark rings on their legs in such combinations that each bird may be recognized by the use of binoculars and he is thus able to follow the history of each individual without trapping it.

The Status of the Water Pipit in England. By H. G. Alexander.

The Avicultural Magazine. (Fourth Series) II, No. 1. January, 1924.

On Keeping Pheasants. By George Beever.

The Avicultural Magazine. (Fourth Series) II, No. 2. February, 1924.

The Duration of Life of Birds of Prey in Confinement.—Review of a pamphlet by Maj. S. S. Flower, director of the Cairo Zoological Garden.

How Settlement and Other Factors are Affecting Native Birds. By A. S. Le Souef.—In Australia.

The Avicultural Magazine. (Fourth Series) II, No. 3. March, 1924.

My Quest for the Imperial Parrot. By Casey A. Wood.—Finds one living specimen in captivity. (Continued in the next issue.)

A series of articles on Finches and Grosbeaks usually kept in aviaries runs through all these numbers.

The Emu. XXIII, Part 1. April, 1924.

Description of Some New Nests and Eggs. By H. L. White.

Notes on Eggs Collected in Central Australia by F. L. Whitlock. By H. L. White.

Journey to Central Australia in Search of the Night Parrot. By F. L. Whitlock.—This interesting bird (*Geopsittacus occidentalis*) seems to be on the verge of extinction. Not a single specimen was obtained although a record of one just killed and eaten by boys was secured. The paper contains notes on a large number of other species.

On the Specific Names of Three Petrels. By L. M. Loomis.—*Procellaria solandri* is maintained in place of *melanops* Gmelin; *Procellaria neglecta* in place of *phillipii* G. R. Gray and *Puffinus chlororhynchus* in place of *pacifica* Gmelin.

Relationships of Tasmanian Birds. By Robert Hall. Part II.

Notes on Extinct or Rare Australian Birds with Suggestions as to Some of the Causes of their Disappearance. By Edwin Ashby.

The South Australian Ornithologist. VII, Part 5. January, 1924.

The South Australian Ornithological Association—Accounts of meetings.

An Ornithological Trip around Eyre Peninsula (with Map). By J. Sutton.—An important paper with notes on 144 species.

The Nest and Eggs of *Diaphorillas Textilis* By A. M. Morgan.

Revue Francaise d'Ornithologie. 16, No. 178. February, 1924. [In French.]

The Migration of Birds. By A. and P. Ferrouillat.

A Contribution to a Study of Costa's Creeper (*Certhia f. Costae* or *C. f. macrodactyla*). By H. Jouard.

Ornithological Trips to the Region North of the Sahara. By Heim deBalzac.—(Continued in the next two numbers.)

Catalogue of the Birds of La Charente. By Count de Bonnet de Paillerets.—(Continued in April.)

Revue Francaise d'Ornithologie. No. 179. March, 1924. [In French.]

Insectivorous Birds and Tree Culture in Madagascar. By Dr. Monnier.

An Adaptive Character of the Crossbill of North Africa. By L. Lavauden.—Considers the heavier and less slender beak as compared with the European bird to be due to the heavier character of the cones from which it derives its food.

Revue Francaise d'Ornithologie. No. 180. April, 1924. [In French.]

A Lunar Rhythm in Aquatic and Shore Birds. By G. Guerin.—Claims a regular movement of these birds during 48 hours before the full moon, which is independent of the regular migratory movements.

L'Oiseau. V, No. 1. January, 1924. [In French.]

This and the December issue are mainly taken up with the articles on Finches in captivity already noticed under 'Avicultural Magazine.'

Ornithologische Beobachter. XXI, No. 5. February, 1924. [In German.]

Storks in Zoological Gardens. By A. Wendnagel.

Report on Bird Ringing by the Swiss Central Station in Bern.

Observations on the Black Woodpecker in Luzern. By J. Bussmann.

Journal für Ornithologie. 72. Heft. 2. April, 1924. [In German].

The Results of my Second Expedition to Mallorca. By Dr. A. v. Jordans.

Bird-life in San Domingo. By Dr. H. Weigold.

Ornithological Observations in the Rhine Province. By F. Neubaur.

Annual Report of the Rossiten Bird Station of the German Ornithological Society. By J. Thienemann.

The Vocal Utterances of Birds. By O. Heinroth.

Weight as a Racial Character in *Tetrao urogallus*. By O. Graf Zedlitz.

Mutation Studies. By E. Stresemann.—*Copsychus amoenus, Trochocercus bedfordi, Eremophila berlepschi.*

The "Formenkreis" of the Marsh Hawk, *Circus aeruginosus*. By E. Stresemann. [See "Correspondence" of this issue for definition of Formenkreis.]

Proceedings of the German Ornithological Society.

Ornithologische Monatsberichte. 32. No. 2. March–April, 1924. [In German.]

The Pairing of Emus. By Dr. O. Heinroth.—In the Berlin Zoological Garden.

Stork Migration over High Mountains. By G. von Almasy.

A Second Brood of Swifts, *Apus apus*. By O. Büsing.

The call of *Asio otus*. By Geyer von Schweppenburg.

Phylloscopus trochilus eversmanni in Heligoland? By O. Graf Zedlitz.—Discussion of racial differences.

New Subspecies from New Guinea and Celebes. By O. Neumann.—*Neopsittacus musschenbroekii major* (p. 38) Schraderberg, N. G.; *Monarcha cinerascens jacobii* (p. 38) Karkellang, Talaut Islands; *M. c. perpallidus* (p. 39) New Mecklenburg Island; *Eupetes caerulescens occidentalis* (p. 39) Mysol.

On the Voice and Care of Young in the Black-necked Grebe By R. Heyder.

In the short notes H. Grote describes *Xenocichla flavicollis simplicicolor* (p. 45), Bosum, New Cameroon., and E. Stresemann, *Circus ranivorus aequitorialis* Kilimanjaro (p. 48), and *C. assimilis celebensis* (p. 48), Celebes. The same author informs us that *Dryoscopus thamnophilus* Cab. is an artefact.

Ornithological Articles in Other Journals.[1]

DeLury, Ralph E. Some Experiences in Bird Banding. (Canadian Field Naturalist, February, 1924.)

Morris, Frank. W. H. Hudson, The Naturalist (1841–1923). (Ibid.)—Continued in March.

Saunders, W. E. Whistling Swans in Ontario. (Ibid.)

Lewis, Harrison F. List of Birds Recorded from the Island of Anticosti, Quebec. (Ibid., March, 1924.)—Continued in April and May.

Munro, J. A. Notes on the Relation of the Dipper (*Cinclus mexicanus unicolor*) to Fishing Interests in British Columbia and Alberta. (Ibid.)—Upwards of 47 Dippers were shot and the verdict is that while they do no appreciable damage to fish spawn in a state of nature, they do considerable damage in fish hatchery ponds where it is recommended that screens be used as a better method of protection than killing the birds.

---

[1]Some of these Journals are received in exchange, others are examined in the library of the Academy of Natural Sciences of Philadelphia. The Editor is under obligations to Mr. J. A. G. Rehn for a list of ornithological articles contained in the accessions to the library from week to week.

Pittman, H. H. The Black-billed Cuckoo in Manitoba. (Ibid.)

Henderson, A. D. The Canada Goose at Home. (Ibid., April, 1924.)

Anon. Official Canadian Record of Bird-banding Returns. (Ibid.)

McWilliam, J. M. The Roosting Habits of the Rooks of Bute. (Scottish Naturalist, January–February, 1924.)

Clarke, W. Eagle. The Lesser Snow Goose in the Outer Hebrides. (Ibid.)

Baxter, E. V. and Rintoul, L. J. The Spread and Distribution of the Woodcock. (Ibid.)—Continued.

Meinertzhagen, R. A Note on the Hedge Sparrows (*Accentor modularis*) of the British Isles. (Ibid.)—Indicates two probable races.

Phillips, M. J. A Grouse's Winter Vacation. (Our Dumb Animals, March, 1924.)—Ptarmigan, with photographs.

Jacobi-O'Meara, Frances. The Screech Owl as a Household Pet. (Ibid., May, 1924.)

Edwards, E. K. The Stoner Annual Bird Census. (Iowa Conservation, October–December, 1923.)—Details of an Iowa Christmas list.

Shufeldt, R. W. Life History of an American Naturalist [i. e., the author]. (Medical Life, February, March and April, 1924.)—To be continued.

Shufeldt, R. W. Birds of City Lots and Gardens. (Fruit, Garden and Home, May, 1924.)—This and the following illustrated by photographs of living or stuffed birds.

Shufeldt, R. W. Well-known Birds Close Up. (Amer. Junior Red Cross News, May, 1924.)

Shufeldt, R. W. Our Vanishing Birds. (National Humane Review, March, 1924.)

Bangs, O. and Penard, T. E. The Identity of *Trochilus ruckeri* Bourcier. (Occasional Papers of the Boston Society of Nat. Hist., April 7, 1924.)—Proves to be the southern form known as *Threnetes fraseri* (Gould) the Costa Rican species formerly known as *ruckeri* is renamed *T. r. ventosus* (p. 77.)

Zimmer, John T. The Wild Turkey. (Zool. Leaflet No. 6, Field Mus. Nat. Hist.)

Hausman, Leon A. Observations on a New Type of Winter Feeding Ground for the Fringillidae. (The American Naturalist, LVIII, pp. 187–190.)

Huxley, Julian S. Courtship Activities in the Red-throated Diver (*Colymbus stellatus*) together with a discussion of the Evolution of Courtship in Birds. (Jour. Linn. Soc. London, Zoology, XXXV, pp. 253–292.)

Stead, Edgar F. Notes on the Migratory Plovers of New Zealand with Records of Some Additional Species. (Trans. and Proc. New Zealand Inst., 54, pp. 490–495.)

Baker, E. C. Stuart. The Game Birds of India, Burma and Ceylon. Pt. XXXV. *Perdicula asiatica.* (Jour. Bombay Nat. Hist. Soc., XXIX,

No. 2, Aug. 25, 1923.)—*Coturnix coromardelicus* in the next part in Vol. XXIX, No. 3.

Gill, E. H. N. Nests and Eggs of the Common Birds in the Plains of the United Provinces, Pt. III. (Ibid.)—Continued in No. 3.

Osmaston, B. B. Bird-life in Gulmarg. (Ibid.)

Stevens, Herbert. Notes on the Birds of the Sikkin Himalayas. Pt. I. —An important contribution. Continued in No. 3.

Wathen, Mrs. M. L. Ornithological Notes from a Trip in Ladak. (Ibid. XXIX. No. 3. Dec. 31, 1923.)

Bates, R. S. P. Notes on Hugh Whistler's "Contribution to the Ornithology of Cashmere." (Ibid.)

Weis, Henning. Life of the Harrier in Denmark. Wheldon and Wesley. London, 1923.

Van Saughene, R. Note on the Oxpeckers of the Belgian Congo. (Revue Zoologique Africain, XII, Fasc. 1, March, 1924.) [In French.]

Mertens, Robert. Contribution to our Knowledge of the Avifauna of German New Guinea. (Senckenbergiana, V, Heft. 5–6, December 20, 1923.) [In German.]—*Lanius schach stresemanni* (p. 228), and *Melidectes torquatus cahni* (p. 229), described as new.

Weigold, H. et al. Zoological Results of the Walter Stötzner Expedition to Szelschwan, East Tibet and Tschili. [Abhl. und Berichte Zool. und Anthrop.—Ethnogr. Mus. Dresden, XV (Sept., 1922) and XVI (April, 1923).]—Birds. New Forms by Kleinschmidt and Weigold.—*Corvus macrorhynchos tibetosinensis* (p. 2.) S. E. Tibet; *Nucifraga caryocatactes interdictus* (p. 5.) Eastern Peking; *Certhia familiaris kwanhsienensis* (p. 7.) Kwanhsien; *C. f. waschanensis* (p. 8.) Waschan; *Sitta europaea itschangensis* (p. 9.) Itschang; *S. e. tibetosinensis* (p. 10) Atentsze; *Parus major subtibetanus* (p. 11.) Tatsienlu. By Hartert: *Alauda arvensis weigoldi* (p. 20) Waschan; *A. a. hainana* (p. 21.) Kiung-Chau, Hainan. Vol. XVI. By A. Jacobi: *Chloris sinica tschiliensis* (p. 25) Peking; *Acanthus flavirostris miniakensis* (p. 25) Tschuwo, Bameh; *Petronia petronia tibetana* (p. 31) Tschuwo; *Passer montanus obscuratus* (p. 32) Hupeh and Szetschwan; *Emberiza cioides weigoldi* (p. 36) Peking.

Mayo, W. M. Some Birds of the Albert River [Australia]. (Queensland Naturalist, IV, pp. 52–54.)

CORRESPONDENCE.

Scientific Nomenclature.

Editor of 'The Auk':

Ornithological nomenclature is again passing through a crisis, as in the period between 1870 and 1890. The dispute which then broke out between binomialists and trinomialists is now completely settled in favor of the latter. This was the most important step, since Linnaeus' great achieve-

ment of organization, toward bringing our ornithological nomenclature into accord with our knowledge of the genetic relations of the forms with one another. But there came a halt, half-way, because examples became known in ever greater number, of two very similar forms living together in the same district without interbreeding. Thus it was demonstrated that similarity alone must not be wrongly assumed to show that two forms are subspecies of a single species. And at first, to eliminate confusing errors, great caution had to be exercised in the use of trinomial names. J. A. Allen found a very happy formula when, in close dependence on Charles Darwin, he proposed to consider intergradation as the touchstone of trinomialism.

Since then the systematic side of ornithology has not remained stationary. Through its close bond with ecology it has become more and more a biological science, and has reached today a height from which the problem of the origin of species can be surveyed far better than was possible in the time of Charles Darwin. To this progress our nomenclature must also adapt itself, unless we are willing to renounce giving it any scientific significance.

We Europeans are accustomed to regard America as the land of progress, and American ornithologists have given us many proofs for the justification of this view. In the matter of nomenclature, however, according to our view, a certain stagnation has set in over there; and we think that we have meanwhile gained a lead in the development. What Dr. Chapman says in his very interesting and very timely discussion of the 'Criteria for the Determination of Subspecies' may be looked upon in America by many ornithologists as a revolutionary attempt to shake the foundations of classification, for as some utterances of well-known systematists show (I am thinking especially of Dr. J. Grinnell's remarks in 'The Auk,' XXVII, 1921, pp. 469, 470), they still look upon the decisions of the A. O. U. Code of 1886 as a *noli me tangere*.

In Europe, however, and especially in Germany, this article of Dr. Chapman's will not provoke any objections whatsoever. The days when intergradation was required as a criterion of the trinomial, either by way of geographic blending or by way of individual variation, are past over here; and a much freer conception has almost universally taken its place. The thorough work on the birds of the Palaearctic region from the pen of Hartert gives evidence of this on almost every page; and it shows in the most convincing manner that the principles by which the adherents of the new order proceed are sound, and that they advance the cause of science efficiently. In its childhood trinomial nomenclature had need of the leading-strings of intergradation, lest it stumble into the many snares of heterogeneous resemblance; but now that it is full-grown it ought to have the courage to jump over obstacles as Dr. Chapman has recommended. The question is however: How far dare one go without introducing too much uncertainty in nomenclature? To draw hard and fast lines for this would be to force Nature herself into a new Procrustean bed.

One of the most acute ornithologists of our time, Dr. O. Kleinschmidt, has been led through his researches on subspecies to the view that the species is a sharply defined entity, which may be highly variable under the influence of external and internal factors, without these variations bearing in themselves the germ of new independent species. He rejects the Darwinian theory of evolution, and takes his stand again on the pre-Darwinian idea of fixity. According to him, even two very similar species, such as *Rhamphastos ambiguus* and *R. abbreviatus*, have not originated from a common stem, but have taken parallel courses of development from the beginning. His conviction allows him to be strictly consistent in nomenclature. The task of the systematic student is then only to list fully the species—or as Kleinschmidt expresses it, the natural groups (Realgattungen)—with all their races. For thirty years all Kleinschmidt's studies have been directed towards erecting and supporting this theory of the "Formenkreis," or group of representative forms. In one comprehensive species (Realgattung) he unites all that ornithologists have customarily regarded as representative species. Thus in the same broad species with the European Goshawk he includes not only all the Eurasian and Nearctic races of *Accipiter gentilis*, but also *Accipiter hensti* of Madagascar, *Accipiter melanoleucos* of Africa, and *Accipiter planes* of New Britain —forms which in part are very unlike *Accipiter gentilis* in their adult plumage.

This method of research has proved to be very fruitful. It necessitates a very careful comparison of all similar forms in morphological as well as biological respects, and results in ascertaining the essential, truly specific characters of a given species. Furthermore, it has become evident from these investigations that as a rule the gaps between natural species are in no wise lessened, even though their conception is made very broad. Specificity is therefore extremely ancient; and if one uses critical judgment, it is rare to find any sure indication of a transition from the race to the species. That such intermediate cases do occur seems however to result from the fact that the sexual affinity between representative forms may be very different in grade. Often it is very pronounced, even in spite of marked morphological divergence (*Colaptes auratus* and *C. cafer!*) or in other cases very slight (*Coracias benghalensis* and *C. garrulus*). Indeed the sexual affinity sometimes varies geographically in degree, as is the case in the relations between *Passer domesticus* and *P. hispaniolensis* or, as I see in Dr. Chapman's article, between *Parus atricapillus* and *P. carolinensis*.

Absolute consistency is thus not possible for the adherents of the Kleinschmidt Formenkreis theory without doing violence to Nature. But they can console themselves with the knowledge that those who claim to follow the A. O. U. Code to the letter also act very inconsistently. If intergradation is the touchstone of trinomialism, why then is the Red-shafted Flicker not called *Colaptes auratus cafer*, and the Golden-winged

Warbler *Vermivora pinus chrysoptera*? Who can prove that racial transition is not also provoked by crossing in many other cases where nearly related forms differ still less from each other? On the contrary, is it not very often the case? I need only recall the races of *Passerella iliaca*, with which we have been made familiar through the excellent monograph of H. S. Swarth. Further, if those who follow the A. O. U. Code wish to be consistent, must they not divide dichromatic forms with strictly alternative inheritance in two species? In the earliest stages *Chrysolophus obscurus*, *Micronisus niger*, and *Clamator serratus* already differ fundamentally from the normal phases, and there can be no question of intergradation through individual variation.

Modern research in heredity, which has led to the search for mutations, has brought into a new light the question of the origin of geographic races. We begin to understand that by a sudden mutation, which changes considerably the color or even the pattern of the plumage, the ornithologists—but not the birds themselves—may be deceived, though in fact the species remains the same. It is quite immaterial to *Buteola brachyura* and *Micronisus gabar* whether its mate is coal-black or not, and *Accipiter novae-hollandiae* pairs just as readily with a snow-white as with a gray consort. What happens with mutations within the same subspecies holds good also in the case where whole populations have been altered mutationally. Here only the ornithologists—but not the birds—recognize two species. The black *Corvus corone* in the border region mates as readily with a gray *Corvus cornix* as with one of its own sort. We may leave therefore to the instinct of the bird, and not to the eye of the skin-ornithologist, the decision as to what belongs to a species and what does not. When one has secured an unequivocal answer it is usually not difficult to fix the bounds of a species, reasoning by comparison, even when the distribution is not continuous. The surprises one experiences when he appeals to the natural instincts of the birds are often very great. What a fundamental difference there seems—to the student of skins—to exist between the tropical *Pericrocotus roseus*, pink below, and the dull gray *P. cantonensis* of southern China. Yet they hybridize where they come together in the province of Kwangtung. So there is only one species! It is not the color that decides, often not even form, but the birds recognize their near affinity by peculiarities which are mostly still unknown to us, but which are much more important than the taxonomic features hitherto recognized.

Of what utility is it to introduce such knowledge into the nomenclature? Dr. Chapman gives an admirable answer when he says: "In the study of both physical and geographic origin of species it is of fundamental importance for us to know whether given forms are species or subspecies." I should like to enlarge and emphasize this thesis. To know whether two forms belong to the same or to two different specific groups (Formenkreise), and to learn how far a natural species has reached in its dispersal is of

fundamental significance to all who concern themselves with the problems of geographic distribution, of the origin of subspecies, of heredity, or of the influence of climate upon size and pigmentation. When by careful investigation we have solved this question, we should see that it is expressed in our nomenclature; otherwise our important result remains hidden in a special work, where the zoogeographers and biologists will easily overlook it, though it is just for them that it would be most stimulating. Again an example: Dr. Chapman himself has very recently investigated the geographic variation within two groups of the genus *Buarremon*, and has shown that in these groups the predisposition has repeatedly been manifested to mutate in a definite direction. His two great groups I and II are however nothing more than comprehensive species, or "Formenkreise," which in my judgment should not be split up in a series of artificial catalog species, but should be called *B. brunneinuchus* and *B. torquatus*. None of the many forms thus reunited under two specific names serves as a bridge to any other "Formenkreis" of the great genus *Buarremon*, and the case is typical for a countless number of others, indeed for nearly all "Formenkreise." I repeat that the gap between natural species (not between the artificial!) is usually very wide.

It will probably be objected that what I should like to bring out with specific names could be stated by the introduction of subgeneric names. I cannot approve such a proposal, since it would be equivalent to quadrinomial nomenclature. May the future preserve us from this! The subgeneric names so far invented would be greatly increased in number, for often they unite just what the Formenkreis theory would keep strictly separate—species closely resembling each other, but physiologically different. What is attained through a broad comprehension of the species is not an overloading, but an unburdening of the memory. One of the most desirable results of this method is the fact that we can again reduce appreciably the number of generic names without the clearness of our nomenclature suffering in the least.

Conclusion.—The surest criterion, in my opinion, or placing two forms together in the same "Formenkreis" (or species) is their physiological affinity, which expresses itself in their inclination to pair. It is an old axiom of systematic zoology that morphological similarity should not induce us to place two forms in one species when experience in nature has established their sexual aversion. Conversely then, morphological difference between two forms ought not to tempt us to count them as two distinct species when experience in nature has given proof that they belong together. The members of a species remain alike in important characters, particularly those relating to ecology, even when they are separated by barriers to dispersal. A knowledge of the life history is thus an important link in the chain of evidence which the systematic worker needs for the correct grouping of forms. Not morphological, but physiological changes evidently bring about the splitting up of bird species. All the morpho-

logical mutations so far known have turned out to be of wholly secondary nature, even though they changed completely the appearance of the species (e. g., *Rhipidura fuliginosa*). What we preserve in our museums, the skin and feathers, cannot be the most essential part of the bird even for the systematic worker.

ERWIN STRESEMANN.

Zoological Museum, Berlin.

NOTES AND NEWS.

LIEUT. COL. HENRY HAVERSHAM GODWIN-AUSTEN, a Corresponding Fellow of the Union since 1884, and an Extraordinary Member of the British Ornithologists' Union, died at his home in Godalming, Surrey, England, Dec. 2, 1923, in the 90th year of his age. He was born at Teigsmouth, England, July 6, 1834, the eldest son of Robert A. C. Godwin-Austen, F. R. S., a distinguished geologist, and Maria, daughter of General Godwin, C. B.

His education was received at the Royal Military College at Sandhurst and upon his graduation he entered upon a military career which lasted 26 years. In 1851 he was gazetted with H. M. 24th Regiment of Foot, now the South Wales Borderers, and the next year went to India which became the scene of his principal work. He served in the Second Burmese War, was appointed topographical assistant on the Trigonometrical Survey of India, and joined the Kashmir Survey party in 1857. He surveyed a section in Kashmir, discovered the glacier which was named in his honor and determined the position and altitude of the great snow peak known as Mount Godwin-Austen, the second highest mountain in the world. In 1862 he surveyed Ladak, in 1863–64 served with the last mission to Bhutan, mapped the country between Darjeeling and Punakha, and in 1877 retired from active service.

Col. Godwin-Austen was best known as an explorer, geographer and conchologist. He was elected a Fellow of the Royal Society in 1880, served as president of Section E (Geography) of the British Association for the Advancement of Science in 1883, as president of the Malacological Society of Great Britain and Ireland in 1908–09, and in 1910 was awarded the Founders Medal of the Royal Geographic Society for his work in exploration.

Between 1870 and 1878 he published, chiefly in the 'Journal' of the Asiatic Society of Bengal and the 'Proceedings' of the Zoological Society of London, a series of valuable papers on the birds of the regions he had explored and in 1893 disposed of his collection of some 3500 bird skins to the British Museum. During his later years he devoted his attentions chiefly to conchology and contributed the volume on the Testacellidæ and Zonitidæ to the 'Fauna of British India.'

Col. Godwin Austen was married twice (1) in 1861 to Pauline Georgiana Chichele-Plowden, who died in 1871, and (2) in 1881 to Jessie Robinson who died in 1913. His portrait and a more extended account of his life may be found in 'The Ibis' for April, 1924, pp. 360–362.—T. S. P.

We Learn that a memorial committee has been organized in Quebec for the purpose of erecting a memorial to the late Napoleon Comeau at Godbout where he spent his life. Comeau's family has entrusted all of his ornithological records and manuscripts to the care of the Provencher Society where they will be available for consultation.

Through the cooperation of the game commissioners of Texas and Minnesota an attempt is being made to introduce the Wild Turkey into the latter State, and a small flock is now being cared for on the state game farm at Mound, Minn.

From 'Bird Notes and News' we learn that the Act of Parliament forbidding the pollution of waters by oil from vessels is being rigidly enforced by the Admiralty and that oil separators have been devised in Liverpool which can be attached to ships and which preclude the necessity of pumping oily water into the sea. In spite of this however, considerable destruction of bird life by oil continues. Mr. H. M. Cleminson, General Manager of the Chamber of Shipping of the United Kingdom presented an important paper on the subject at the meeting of the National Coast Antipolution League of America at the meeting at Atlantic City, N. J., last autumn.

The Attempt of the New Jersey Audubon Society to have the Bobolink placed on the protected list continues to meet with failure through the treachery of members of the Legislature and the political maneuvering which prevented a vote being taken when the bill was sure of passage. The April 'Bulletin' of the Society should be read by all bird lovers in the State as it shows just where the legislators stood on the matter.

The Second number of 'Our Vanishing Game' published by the Permanent Wild Life Protection Fund and edited by William T. Hornady and Dr. W. Reid Blair, illustrates the terrible inroads that are being made on our game, "within the law," and with four million and a half licensed hunters in the United States in 1922 it is hard to see how the game species are to be preserved unless bag limits are very materially decreased.

The Second Edition of the Royal Australasian Ornithologists' Union Check-List has been drawn up in mimeograph form for comment and suggestions and the list will be published in the near future. The Committee in charge consists of Dr. A. J. Leach, A. J. Campbell and W. B. Alexander.

PRINCE N. TAKA-TSUKASA, President of the Ornithological Society of Japan, has recently been making a brief tour of the United States and examining the leading ornithological collections. The prince is especially interested in the Psittacidae.

INFORMATION about birds has been broadcasted from various Radio stations throughout the United States. One address on Spring Birds was given by Dr. Dayton Stoner from the University of Iowa Station and has also been published in the University 'Service Bulletin' for March, 1924.

THE ANNUAL meeting of the Baird Ornithological Club was held on March 26, 1924, at the Cosmos Club. Officers for the year ensuing were elected as follows; President, Dr. A. K. Fisher; Vice-President, Dr. Alexander Wetmore; Secretary, Bradshaw H. Swales; Members of the Council, Drs. W. C. Richmond and T. S. Palmer. At the meeting held February 26, 1924, Mr. H. W. Henshaw was elected an Honorary Member. The Club enjoyed a prosperous year with exceptionally well attended meetings.

THE TEN lectures entitled "An Introduction to the Study of Birds," delivered by Dr. Glover M. Allen, Secretary of the Boston Society of Natural History, under the auspices of the New England Bird Banding Association, are to be brought out in book form under the title of 'Birds and Their Attributes' by the Marshall Jones Company. A portion of the material formed the basis of a reading course offered by the 'Boston Transcript.' The book will be illustrated by at least 32 pictures made from plates furnished or used for reproduction on the screen by Dr. Allen.

IN VIEW of the success of former exhibitions of such a nature the Local Committee plans to hold an exhibition of bird paintings and drawings in connection with the coming meeting of the American Ornithologists' Union at Pittsburgh, Pa., in November next, to show the best of the work being produced by contemporary bird artists. The exhibition will in general be along the same lines as at the Chicago meeting of 1922. It has been thought best, however, to limit the pieces from a single contributor to six. These may be framed or unframed, and either oil, water color, crayon, pastel, or charcoal. Pictures should be sent early in the fall, so as to give the Committee ample time to prepare the exhibition. All pictures will be exhibited under glass and to the best advantage possible.

The exhibition will probably last several weeks, and it is therefore requested that all pictures be loaned for a longer time than the A. O. U. meeting proper. In sending pictures contributors should give their full name, and a memorandum of the label for each picture submitted. Transportation charges for exhibits sent will be defrayed by the Committee when desired. Communications on the subject should be addressed to the chairman of the sub-committee, Mr. George M. Sutton, Carnegie Museum, Pittsburgh, Pa.

THE MEETING of the Union in Pittsburgh, which will be held November 11–13, 1924, with business sessions of the Council, Fellows and Members on November 10, will be the first to be held in that city. The opportunity will be offered to many members residing in western Pennsylvania and New York as well as in Ohio and other parts of the Middle West of attending a gathering of the A. O. U. near home, while members coming from more distant points will be able to study the splendid ornithological collections of the Carnegie Museum which many of them have never seen. It is none too soon for all members to make arrangements which will permit of their making the trip in November. The larger the attendance, the more successful the meeting and the greater the impetus given to ornithological research and bird study. Mr. W. E. Clyde Todd, Chairman of the committee of arrangements, Carnegie Museum, Pittsburgh, or Dr. T. S. Palmer, Secretary of the A. O. U., 1939 Biltmore St., Washington, D. C. will furnish any desired information, relative to the meeting.